

A decorative border in a Greek key (meander) pattern, rendered in black ink on a light-colored, textured background. The border runs along the edges of the page, with diagonal sections at the corners.

# RECORD

F. R. Fosberg  
Collection Book # 21  
Nos. 28323 - 28868

Boli na  
all done except  
449

F. A. Fosberg # 21  
Nos. 28323 - 28868

Descriptive passages copied  
for files Aug 74 BD.

Descriptive passages copied  
for files Aug 79 B.D.

Collection and Field Note Book

No. 21

(August 6, 1947 - Oct. 24, 1947)

(28323 --- 28868)

	Pages
PERU .....	2-27, 132-195
Paso de Acanacu .. 28323-28329 .....	2-3
Puente Mercurio.. 28330-28331 .....	2-9
Santa Ysabel..... 28350-28358 .....	8-9
Valley, Rio Cosnipata 28359-28360 .....	12-13
Rio Tambomayo .... 28361-28363 .....	12-13
Paso de Acanacu... 28364-28368 .....	14-15
Cuzco ruins..... 28369-28377 .....	14-17
Rio Huatanay .... 28378-28392 .....	16-20
Rio Vilcanota ... 28393 .....	20-21
Ollantaytambo.... 28394-28398 .....	20-21
Pisak ruins .....	28399-28404 .....
Train trip-leaving Cuzco.....	20-26
La Raya .....	28405-28409 .....
Juliaca .....	28410.....
Puno-Cuzco by rail .....	132-133
Araranca .....	28711 .....
Cuzco.....	28712-28714 .....
Machupicchu .....	28715-28730-28735 ..
Aguas Calientes... 28736.....	138-139
Puno-Arequipa by trail .....	140-144
s.w. Vincocaya ....28737 .....	144-145
Pucachancha..... 28738 .....	144-145
Arequipa-Chala by road .....	146-147
s.e. Camana .....	28739-28770 .....
n. of Chala .....	28771-28778 .....
s.e. Valle de Vaca 28779-28781 .....	156-157
Nassa .....	28782-28785 .....
Chala-Ica by road .....	158-161
Ica-Lama by road .....	162-163
n.w. of Chinchu ...28786-28787.....	164-165
Asia .....	28788-28791 .....
Lima .....	28792-28796 .....
Tingo Maria .....	168
Tingo Maria-Pucallpa ... 28797-28806...	175-175

PERU

La Divisoria .....	28807-28810a .....	174-175
	28823-28833.....	178-181
	28968.....	194-195
Fundo Sinchona .....	28811-28822.....	176-179
Pumahuasi .....	28834-28838 .....	182-185
Hacienda La Vega .....	28839-28847 .....	184-187
Carpish Pass .....	28848-28862-5 ...	188-191-193
Rio Chinchu Valley..	28866-28967.....	192-195
BOLIVIA.....		28-131
Guaqui.....		28
n.e. of Cruro.....		29-31
Tolapalca .....	28411 .....	32-33
Cona Cona .....	28412-28416 ....	34-35
Tacopaya .....	28417-28420 ....	36-37
Colcha .....	28421-28423 ....	38-39
Irpa-Irpa, Parotani.....		40-41
Cochabamba.....		42-63
Rio Huairamayu canyon	28424-28452..	44-51
Montepunco .....	28453-28457.....	52-53
Inca Chaca .....	28458-28463-89...	54-63
	28490-28492 ....	62-63
La Cumbre .....	28493-28501.....	64-65
Unduavi .....	28502-28503 ....	64-67
Chuspipata .....	28504-28508 ....	66-67
Sacramento Chico..	28508 .....	66-67
Rio Coroico .....	28509-28518 ....	68-75
Cupulani Valley ..	28519-28523 ....	74-65
Rio Umduavi Vly...	28524-28527 ....	76-77
Quebrada de Zongo..	28528-28565 ....	76-85
Zongo .....	28566-28567 ....	84-85
La Paz .....	28568-28576 ....	84-87
Rio La Paz Canyon.	28577-28588 ....	86-89
Air trip La Paz-Oruro, Cochabamba,		
Santa Cruz .....		90-91
Santa Cruz. 28589- 28593, 28653-655..		110-111, 90-93
Trip Santa Cruz-Bermejo, up Rio Pirai		94-95
Bermejo .....	28594-28600 -1..	96-97 -99
Tres Cruces .....	28602-28616 ....	98-103
Bermejo .....	28617-28643 ....	102-109
Rio Bermejo gorge..	28644-28652 ....	108-111
Rio Choqueyapu canyon.	28656-28666..	110-113
Rio Unduavi .....	28667-28669 ....	114-115
w. of Chulumano	28670-28674	114-117
w. of Tajma	28675-28689	116-121

(see next page)

No. 21  
(continued)

BOLIVIA (continued)

Chulumani-Tajma Rd ...28692 .....	120-121
Chulumani ..... 28693-28694 .....	120-121
La Paz ..... 28695-28696 .....	122-123
28708-28710 .....	128-129
s. of La Paz, El Alto-Ayoayo, Altiplane .....	122-123
La Paz-Guaquin by rail .....	128-129
Collano ..... 28697-28699 .....	124-125
Colamarca ..... 28698-28707 .....	124-125
Lago de Titicaca (Crespo & Perez) .....	130-131

F. R. Fosberg  
Collection Book # 21  
Nos. 28323 - 28868

Bolivia  
all done except  
no 44 &  
p. 54

F. A. Fosberg # 21  
Nos. 28323 - 28868



Miniature  
Account Book  
No. S 136

UNIT RULED

Journal . . . . .  
Cash Book . . . . .  
Record (29 Lines) .  
Ledger, Double Entry  
Ledger, Single Entry

Made in 200 and 300 Pages

Made in U.S.A.

TO REORDER, SPECIFY NUMBER,  
RULING AND THICKNESS INDICATED  
ON BACKBONE OF THIS BOOK.

Si encontrada, favor a mandara:  
If found please return to:

F. R. Fosberg  
c/o nearest U. S. Consulate  
al Consulado de E. E. U. U. mas cerca

or c/o E. P. Killip  
Smithsonian Institution  
Washington, D.C.

long.

hen  
ripe.

2  
J (107)

1947 Peru

Aug. 4 - Pasode Acanacu

steep sparsely bushy  
slope 3900 m.

28323

*Pernettya*  
common

(2)

1 24

*Gaultheria*  
rare

1 25

*Gerardia*  
rare

1 26

*Gaultheria*  
common

3 27

*Galium*  
rare, rock crevices

3 28

*Gaultheria*  
common, mostly sterile

1 29

*Rubus*  
rare, local on steep slopes

110

Aug. 6 Puente Mercurio,  
Rio ~~Mayotambo~~ Yanamayo  
well above where it unites <sup>with R. Mayotambo</sup> to form Rio Cornipata  
thick wet forest on steep  
slope

3 30

*Calceolaria*  
rare in wet ravine

1 31

*Rubus*  
common in second growth slopes

Cuzco - Paucartambo 3

13° 9' S  
79° 32' W

berries lavender,  
said to be poisonous  
"macha macha"  
fruit black.

recumbent; flowers  
rose-purple.  
berries black,  
edible.

prostrate, fruit  
greenish.  
fruit black

3800 m.  
(2)

small shrub; fruit  
very large, free from  
receptacle

Yanamayo

2500 m. (2.)

subfruticent herb 2 m. long.  
flowers yellow.

tangled vine fruit  
immature, said to be black + edible when  
ripe.

1947 Peru

- 28332 *Calceolaria*  
common in wet places
- 100m 33 *Cinchona pubescens*  
common locally on steep slope
- 10 34 *Cinchona pubescens*  
same
- 6 35 *Palisourea*  
in undergrowth in dense forest on steep slope
- 15 36 *Cinchona*  
common locally on steep slope, mostly
- 5m 37 *Cinchona*  
same
- 5 38 *Cinchona*  
same Det. P.E. Berry, 1998
- 6 39 *Fuchsia sanctae-rosae* O. Kuntze  
common in brush near road

Cuzco - Paucartambo 5

- herb 1 m. tall; flowers bright deep orange.
- tree 10 m. tall; leaves dull above; flowers very fragrant, crimson outside, pink inside tube, pale pink inside lobes.  
Fruit infected with *Elsinoe cinchonae*.  
(bark sample A)
- same, tree 8 m. tall  
(bark sample B)
- slender shrub 2 m. tall, fruit green.
- tree 10 m. tall, 20 cm. thick; flower crimson without and inside tube, lobes pink within, odorless (only one seen); fruit mostly immature, apparently infected with *Elsinoe*.  
(bark sample E)
- same, ~~flowers~~ no. fls.  
(bark sample C)
- same buds pink.  
(bark sample D)
- shrub 2-3 m. high, flowers scarlet

- 28340 *Monnina*  
4 local in thick tangled
- 2 41 *Styrax*  
local in undergrowth
- 4 42 *Mertensia granadensis*  
wet place at side of road
- 4 43 *Liphocampylus*  
brushy slope
- 4 44 *Fuchsia austromontana* I.M. Johnson  
common on brushy slope  
Det. P.E. Berry, 1998
- ✓ Aug. 6 - Rio ~~Mayotambo~~ Yanamayo  
below Puente Mercurio  
steep slopes of slaty  
rotten shale, second  
growth brush.
- 3 45 *Melastomataceae*  
common
- 46 *Liphocampylus*  
common, open slopes
- 2 47 *Vernonia*  
common on open slopes
- 4 48 *Fuchsia chloroloba* I.M. Johnson  
Det. P.E. Berry, 1998

- vine-like, flowers  
deep purple.
- slender shrub;  
flowers white.
- prostrate; flowers  
pale greenish; fruit  
juicy, red.
- elongate shrub,  
flowers ~~scarlet~~  
scarlet, lobes greenish  
yellow.
- weak shrub 1.5 m. tall,  
flowers crimson.

2300 m. (A)

- shrub 2 m. tall,  
flowers crimson-purple.
- ~~herb~~ herb 1 m. tall,  
fls. greenish-yellow,  
red outside of tube,  
anthers black.
- herb 1.4 m. tall,  
flowers purple.
- tuberous-rooted slender  
shrub, flowers pendent, vermillion  
with green lobes.

1947 Peru

287 49 *Polypodium*  
common

✓ (III) Aug. 4 Santa Yrabel,  
Rio Coanipata  
very weedy cultivated land  
along river.

50 *Eupatorium*  
common

51  
common

1 52 *Gardenia*  
cultivated

3 53 *Acalypha*

4 54 *Centropogon*

31 55 *Cinchona (Ladenbergia) magnifolia* A.P.  
rare, in clump of trees  
on wet bench above river.

6 56  
common weed  
in cultivated field

1 57 *Drymaria*  
common weed in cultivated field

5 58 *Liparona*  
thicket near river, wet ground

Cuzco - Paucartambo 9

herb 1 m. tall, flowers  
white.

herb 1 m. tall; flowers  
violet.

shrub; flowers  
white, fragrant.  
shrub 2 m. tall.

elongate shrub;  
flowers vermilion,  
lobes yellow, column  
pale yellow, anthers blackish.  
tree 18 m. tall, 40 cm. thick;  
leaves sub-glossy; flowers  
white, very fragrant  
with gardenia-like odor,  
corolla lobes somewhat fleshy;  
fruit mostly immature  
seed, flowers pinkish white.

(bark sample)

spreading shrub, strong lemon grass  
odor, fruit turning pinkish.

Peru 1947

Aug. 6 - Valley of Rio Mayotambo and Cosnipata, road from Paucartambo to Santa Yzabel.

The road ~~starts~~ crosses Vaso de Acanacu at 7900 m. in puna with sparse brush. Soon patches of forest are reached, and at about 2000 m. all cleared land is left behind, except that roadsides are cleared. The valley is solidly wooded below.

The two species of *Cinchona* are growing commonly together, but no evidence of hybridization was seen. This may be due to the lack of overlapping flowering seasons.

The narrow leaved one had <sup>just</sup> only a few buds and one open flower, while the broad leaved one was just coming into flower.

The narrow one is certainly connected with

Cuzco - Paucartambo 11

The purple flowered northern ones, though the flowers are red almost as in the local *C. pubescens*.

At Santa Yzabel is another *Cinchona*, locally called "calisaya" (28355). Apparently no large quantities were harvested here during the war.

(Owner of S. Y. says much was exported, all of it "calisaya" which here is *Ladenbergia magnifolia* (28355). This is hardly likely but should be checked.

Above, near where the R. Yanamayu & R. Mayutambo unite to form R. Cosnipata are rather *Cinchona*s, one a *Ladenbergia magnifolia* type with leaf blades decurrent on petioles, the other a *Cinchona pubescens* (?) type similar to that of Quillabamba, also with leaf blades decurrent. The pink flowers of this have no odor!

- ✓ Aug. 7 - Valley of Rio Cosmipata  
just above Santa Ysabel  
road cut in wet forested region
- 28359 *Lycianthes*  
60 *Besleria*  
common

done J

✓ (198)

- Aug. 7 - Rio <sup>Tambomayo</sup> ~~Mayatambo~~,  
just above where it joins  
the Rio Yasmamayu to form  
the Rio Cosmipata 1200 m. (2)  
dense wet forest with  
tangled underbrush on  
remnant of old alluvial  
fan with huge boulders
- 3 61 *Chusquea*

- 12a 62 *Cinchona* (*Ladenbergia*)

- 24a 63 *Cinchona pubescens* var.

I

flower green, campanulate.  
leaves thin-fleshy, pale  
beneath, veins red; flowers  
brilliant vermillous,  
oblique.

tangled masses, climbing;  
most plants fruiting  
or just past fruiting  
here. "yara yara".

tree 12 m. tall, 14 cm. thick;  
bark only somewhat bitter;  
fruit immature. (bark sample F)

tree 10 m. tall, 10 cm. thick;  
flowers deep pink, odorless;  
fruit immature. (bark sample G)

14

1947 Peru

✓ 107

Aug. 7 Pasode Acanacu,  
~~Cosnipata~~ headwaters of  
Rio Cosnipata

rocky roadsides on  
steep grassy slope 3800 m.

28364

Lycopodium

1 65

Asplenium

5 66

Jamesonia

common locally

5 67

Jamesonia

common

6 68

rare

✓ 112

Aug. 8 - Cuzco, ruins of  
Sacsahuaman and canyon  
below ruins

dry grassy hills

5 69

Grapphalium

canyon walls, common

1 70

dry canyon walls, rare

1 71

Oenothera

rare on dry canyon walls

Cuzco - Paucartambo  
- Cuzco

15

28364a Galium hypocarpium  
vine-like; fruit orange,  
fleshy

erect.

erect.

strictly erect

erect.

shrubby tree 3 m. tall;  
flowers campanulate,  
yellow outer dusted  
outside with purple.

13° 31' S

71° 59' W

branched sprawling herb,  
1 m. long. (mostly dried up).  
leafless, stem bronze-  
purple, pedicels and  
ovary same; ~~to~~ perianth  
red.

branched at base; flowers  
orange, stigma deeply 4-lobed, lobes spreading

28372

*Grindelia*

common on dry hills, mostly dried up

6 73 *Senecio rudbeckiaefolius* Meyen et Walp. det. J. Cuatrecasas  
occasional on dry hills5 74 *Baccharis peruviana* Cuatr. var. det. J. Cuatrecasas  
occasional on dry hills2 75 *Daucus*between rocks in ruins  
of temple1 76 *Apium*between rocks in ruins  
of temple3 77 *Galium* (*Relbunium*)between rocks in ruins  
of temple.

✓ 100

Aug. 9 - Río Huatanay, 1 km.  
below San Sebastián, 7 km.

13° 33' S

71° 56' W

down ↓

e.s.e. of Cuzco

3400 m (±)

grassy salt flats and wet sandy  
river bed.4 78 *Baccharis tricuneata* v. *lineata* (Cuatr.) Cuatr. det. J. Cuatrecasas  
common on banks and

raised places in grassy flats

1 79 *Gentiana sedoides*occasional in very salty  
places

2

80 *Hypochaeris andina*common on wet <sup>grassy</sup> banks along river

flowers yellow.

branched sub-shrub,  
flowers yellow.

prostrate

prostrate, purple; fruit  
white, fleshy.

prostrate, gray-green

plant slightly glaucous,  
somewhat fleshy, flowers  
white or slightly lilac,  
with green stripes outside  
flowers ligules white, tinged  
with pink, outer ones purple-bronze without.

28381

5

common on wet sand and in running water

82 *Spergularia*  
wet sand83 *Ruppia*

in running water

84 *Poa*

in wet sand, rare.

85 *Juncus*

in wet sand

86 *Cotula*

in wet sand, common

87 *Halicornia*in very salty flat, encrusted  
with white powdery salt deposit88 *Juncus*

very common in grassy flats

89 *Plantago*in very salty place, encrusted  
with white powdery salt deposit90 *Cotula*

rare in grassy flat

91 *Senecio*

rare in wet sand

92 *Galium*on dry banks around  
edge of salt flat

↑

## Cuzco - Cuzco

leaves smaller and narrower on sand than in water  
forming small circular  
mats; leaves fleshy; flowers white.  
prostrate; fleshy; flowers  
purple.forming large masses,  
immature, no fruit.  
spreading tuft

spreading dense tufts

dense tufts; leaves  
sub-fleshy.fleshy; spikes terete  
much thicker than stem,  
red.leaves bluish green;  
bracts purplish, disk  
yellow.

disk yellow

prostrate, leaves  
purple; fruit white,  
fleshy.

- ✓ (113) Aug. 10 - Rio Vilcanota about half-way <sup>72°11'W 13°15'S</sup>  
 between Urubamba and Ollantaytambo,  
 Prov. Urubamba, Dept. Cuzco  
 dry salt flat near river <sup>2800 m.</sup>  
 28397 *Spergularia*  
 common, mostly dry or eaten by sheep.

- ✓ Aug. 10 Ollantaytambo Ruins, <sup>72°17'W 13°15'S</sup>  
~~Rio Vilcanota~~  
 Prov. Urubamba, Dept. Cuzco.  
 dry rocky terraces of Inca m. <sup>2800 m.</sup>  
 94 *Nicotiana*  
 common, weedy, ~~thorny~~ <sup>thorny</sup> ~~region~~.

- 3 95 *Nicotiana*  
 common, weedy

- 2 96 *Tillandsia*  
 common on rock cliffs

- 2 97 *Heliotropium*  
 occasional

- 4 98  
 occasional

- ✓ Aug. 10 - Pisac ruins, Pisac, <sup>71°51'W 13°27'S</sup>  
~~Rio Vilcanota~~  
 Prov. Calca, Dept. Cuzco  
 crevices in stone walls of ruins <sup>2250 m.</sup>  
 1 99 *Solanum*

28400

erect, fleshy; flowers white.

shrub 1-2 m. tall, malodorous;  
 leaves gray-green; flowers  
 light green, lim patent.shrub 1-2 m. tall, malodorous  
 leaves gray-green; flowers  
 light green, limb reflexed.  
 tufts, gray.leaves very rugose; flowers  
 lavender.much-branched, odorous  
 suffrutescent herb; leaves  
 glaucous; flowers purple-blackripe fruit yellowish  
 leaves glaucous, fungus-  
 infected.

23401 Conyza

1

1 02 Coreopsis

2 03 Drymaria

1 04 Eustephia

Aug. 11 - Leaving Cuzco by train, went down the valley of Rio Huatanay, then up the Rio Vilcanota. The lower R. Huatanay is a canyon with steep sides, covered by Puya and ~~other~~ Cereus, as well as shrubs, with a flat floor. The R. Vilcanota is broader, with cultivated flats and salty grassy ~~ones~~, some very wet.

Eucalyptus is very common. planted. Extensive salt flats below Sicuani. Valley lined by dry hills, cultivated wherever possible, steep slopes made less susceptible to erosion by half-terraces.

Cuzco - Calca  
- Canchis

flowers and bracts purple-tipped.

flowers yellow.

~~dry~~ plants almost dry, diffuse.

stems and ovaries bronze-purple, perianth red with yellow-green tips.

After Aguas Calientes, where there is a boiling spring of hot water, the landscape becomes pure puna, with scree slopes on the sides, the great chain of snow capped peaks at the left ending in the Nudo de Vilcanota. The vegetation is sparse bunch-grass with small ~~of~~ Pycnophyllum cushions between, there a golden-green. There is no cultivation here, though people are occasionally seen driving herds of llamas. To the left, near the top are frozen waterfalls. Patches of a gray Puya on slopes.

✓ Aug. 10 - La Raya <sup>near</sup> top of  
pass bet. Vilcanota and  
Pucará drainages

4314 m. (m)

puna, with several  
bunch grasses, wet in  
places and supporting  
large *Distichia* mats.

28405

*Azolla*

floating in ditch

3

06

*Luzula*

in grass cushion

2

07

common, ~~large dry tufts~~

2

08

common

2

09

*Distichia muscoides*

common on flat more or less dry ground

↑

On the Pucará side the  
descent is gradual through  
a flat valley. Here are  
white cushions of *Opuntia*,  
on the slopes patches of *Puya*.  
The floor is grassy and  
large herds of llamas,  
cattle and sheep are grazed  
on it. Apparently burning  
is much practiced.

71° 1' W

14° 30' S

saddles and ditches  
with *Azolla*, etc.

reddish, firm.

heads drooping.

large dry tufts.

short tufts

flat prickly but yielding  
cushion.

Near Santa Rosa a slight  
amount of cultivation  
begins. It is so slight  
as to be unimportant  
and does not increase  
much till after Ayavari.  
Even as far as Tirapeta  
grazing seems much more  
important, esp. on the  
broad flat valley floor.

1947 Peru

Below Pucará the valley greatly broadens out until below Laro it becomes a wide grassy plain. Still grazing seems to be the main industry, except on rises, hills, & the surrounding slopes. The grass has in most places been grazed too close.

don't  
J

v

28410

6

I

Aug. 11 Juliaca, Prov. Puno, Dept. Puno 70° 8' W 15° 35' S  
Buddleia  
cultivated in plaza

Vargas told me in Cuzco that *Pyrenophyllum* is an important fringe for alpacas.

Puno - Lampiza  
- Puno

This continues to Juliaca, a bit more cultivated toward there.

In the plaza is an unusual species of *Buddleia*, with orange flowers, cultivated as an ornamental tree.

compact tree with round crown, 4 m. tall, 10 cm. thick; flowers deep orange. "kolla"

Aug. 12 Juagui, ~~river~~  
 part on Lake Titicaca  
 From the port toward  
 the lake is a flat about  
 2 ~~km~~ m. above the level of  
 the lake. It is said locally  
 that since 1930 the level  
 of the lake has fallen  
 that much. The top layers  
 are a peaty black soil,  
 but just above water  
 level is a stratum  
 of white clay of unde-  
 termined thickness.

Aug. 17 - salt flats n.e.  
 of Oruro, 3700 m. Basic  
 vegetation a fine grass,  
 prob. *Distichlis*, very  
 closely cropped. Here and  
 there, over large areas,  
 the ground is <sup>partially</sup> covered by  
 cushions of *Pycnophyllum*  
 up to 0.5 m. across, various-  
 ly distributed, sometimes  
 1 m. apart, sometimes almost  
 confluent. In other places,  
 nearer Oruro, are similar  
 cushions of *Atriplex* (?), a  
 prostrate species with  
 short erect inflorescences  
 a few cm. high. Toward  
 the east grain is cult-  
 ivated on this flat, ~~rows~~  
 sown in rows - at this  
 season only stubble.  
 Scattered here and there are  
 bunches of a quill-like  
 grass, toward the east  
 becoming abundant.  
 Toward the east the cushion  
 plants disappear, the soil  
 becomes <sup>more</sup> sandy and probably  
 less alkaline or saline.  
 Still further east the

cushion-plant, *acappas*, incl. a cushion *Opuntia* (rare). The central cultivated ~~part~~ sandy part of this flat is slightly higher.

Still further east begins a grade up to the foot of the mountains. Here bunch-grass becomes dominant but with an important admixture of *Bascharis* (?) and several gray thorny plants, all dwarf-shrubs. This is near Paria (itself situated in a salty broad flat bottom of a ravine). A *Nicotiana* (?) is common along the embankments.

Beyond Paria the grass becomes less abundant and the dwarf shrubs, esp. <sup>a legume</sup> ~~with~~ <sup>thorny</sup> spines and tiny pinnate leaves, <sup>(28414)</sup> become dominant. The fine grass still forms a thin ground cover. The railroad here follows up a stream, on the side of its ravine. It is saline.

Near the stream the bunch grass is still abundant, varying locally. At 10 a.m. in bright sun there is still ice in places along the stream. There are still cushion-plants, esp. near the stream. The one that resembles *Pycnophyllum* may be *Arenaria* or something else of that sort. Upward the ravine - bottom broadens into a plain and is cultivated <sup>s. of C. de Huallac</sup>.

Upward ~~to~~ <sup>s. of C. de Huallac</sup> the flat bottom becomes narrow and almost bare gravel, while on the ravine slopes the dwarf shrubs become larger, more varied. The cushion *Opuntia* becomes more common, possibly more than one sp. Then the r. enters a canyon, through rock portals formed of a hard <sup>diverterly</sup> tipped almost vertical bed. In this canyon cushion plants dominate on flat benches, dwarf shrubs + grass on slopes, nothing on gravel stream bed.

1947 Bolivia

# 28411 (Tola?)

~~Parastrephia~~ becomes more and more dominant as higher altitudes are reached, <sup>the pass near Tolapalca (3909 m.)</sup> ~~the pass (4137 m.)~~ The vegetation is practically a mixture of bunch grass and ~~Parastrephia~~ <sup>28411</sup>, badly over-grazed by sheep and llamas.

✓ 16 Aug. 17 Tolapalca

Oruro

mixture of # 28411 + bunch grass of several sp. on bench or ravine walls of decomposed rock

28411 *Parastrephia lepidophylla* (Wedd.) Cabrera  
codominant det. J. Cuatrecasas

The gray spiny shrub reappears on the Cochabamba side of the pass. A mixture of grass and 28411 is continuous to Banderani. <sup>(3998 m.)</sup> Here a small *Astragalus* <sup>(?) (28412)</sup> and a *Perezia* (?) become common. Here also is a saline flat covered by a close grass turf. In wet places *Hypochaeris andina* (?)

Oruro, - Cochabamba 33

above Tolapalca the slopes of the canyon become steeper and grass more dominant. In occasional flat benches 28411 is still dominant. In the headwaters <sup>except</sup> in the pass (4137 m.) grasses take over almost completely. There are still cultivated patches. In the pass 28411 is still common.

all overgrazed

3906 m.

17° 52' S  
66° 43' W

green dwarf shrubs up to 4 dm. resinous, flowers yellow, several plants represented.

is present. This region is overgrazed. The rocks are sedimentary beds, ~~not~~ strongly tilted and distorted. Down the canyon the scrubby vegetation becomes richer and <sup>near</sup> Cona Cona ~~small~~ small columnar <sup>(28413)</sup> *Cerei* appear. Also *Solanum* + *Barnadesia*.

don J

✓ (31)

Aug. 17 Cona Cona, Rio Arque 3578 m. (m.)

28412

21

dry scrubby ~~canyon~~ <sup>wall</sup>  
*Senecio pampae* Lingh. det. J. Cuatrecasas  
common

4

13 *Solanum*

Ventillas

✓

Aug. 17 just below Cona Cona 3578 m. (m.)  
Rio Arque

1

14

~~common~~ common on steep  
wall of decomposed rock

below

~~below~~ Ventilla The canyon  
floor becomes flat and  
gravelly. *Nicotiana*  
*glauca* appears in  
benches and embankment

✓

Aug. 17 Aguascalientes  
Station, Rio Arque, Coch.  
canyon with dry brushy walls

2

15

*Cupressus*

planted near r. station

5

16

*Salix*

planted near r. station.

erect, branched at base,  
0.8 m. tall, flowers  
yellow.shrub 1 m. tall, spines  
mainly distal.

3352 m. (m.)

young tree 5 m. tall,  
bluish green.Trees 4 m. tall, weeping  
habit.

Below Aguascalientes  
*Schinus molle* appears  
 on canyon walls,  
 also *Puya* and a slender  
 yellowish *Cereus*, as well  
 as the thick one mentioned  
 above. *Nicotiana glauca*  
 is common. The vegetation  
 is more luxuriant  
 but still a dry scrub.  
*Mutisia* enters.

*Populus* (Lombardy), *Eucalyptus*  
*globulus*, + *Salix* (28416)  
 are cult. A red-purple  
 fld. *Scroph.* (or *Sal.*)  
 becomes common.

Aug. 17 Tacopaya, on Rio  
 Arque Cochabamba

steep, bushy canyon wall

28417 *Cassia*  
 occasional

18 *Franseria*  
 common

19 *Schinus molle*  
 common

20 *Nicotiana glauca*  
 common, esp. on small gravel flats.

*Salvia*, *Franseria* (28418),  
*Alonsoa* (?), *Cassia* (28417),  
 several *compositae* also  
 become common, also  
*Buddleia* (?).

3148 m. (m.)

erect sparsely branched  
 shrub.

straggling shrub,  
 leaves grayish.  
 small tree 5 m. tall,

fls. cream white with unpleasant oily odor when broken, fruit pink  
 erect shrub 1.5 m. tall, leaves  
 somewhat glaucous, flowers yellow.

Below Chancalla the canyon gets drier and drier, but *Schinus* is still common on walls, with a ~~small~~ branched slender *Cereus*.

Aug. 17 Colcha, Rio Arque

27421 shale cliff (re. cut.)  
*Stevia*

1 rare  
22 *Stevia*  
common

23 *Muddlica*  
↑ occasional

The Rio Arque is very saline & alkaline. Below Arque the bed is white & excavated. Here the valley broadens, with alluvial fans covered by *Schinus* and still another branched slender *Cereus*. The bed is wide, flat, gravel and almost without vegetation.

at Arque lowbarked poplars and the erect form of *Salix chilensis* are growing together, planted, of course.

Above Colcha *Platycodon* first appears.

28098m (m. s.)

2773m. (m.)

branched at base, 0.8 m. tall, flowers white.

much branched, weak; flowers pale yellow-green; bracts purple-tipped. weak much branched hanging shrub; flowers burnt-orange.

Several *Cerei* are very common on the brush-covered walls of the canyon. What appears to be a small *Prosopis* is also common. *Dodonaea* appears below Orcoma at about 2,500 m. A *Ceciba* or other *Bombacaceae* small tree with thick conical trunk & excurrent branching also appears here. *Dodonaea* is dominant on alluvial fans.

Yupa-Yupa is on a great alluvial fan, dry & bushy with cacti, *Schinus*, etc. Here the r. starts to climb, up the broad valley of Rio Uechi, greener and more vegetated on its floor than that of Rio Arque. A *Spondias* (?) is prominent, also *Prosopis*. Near Buenavista (2378 m) a *Phragmites* or *Arundo* is common along dry watercourses.

(this is the station for Capinota).

Above here the forest on sides and floor of valley is thorn-forest - *Prosopis*, *Cereus*, *Schinus*, etc.

Along the river (much more water than Rio Arque) are *Salix* and small irrigated patches.

The hills are bedded shale. In the branches of several *Prosopis* were seen what appeared to be unbelievably large tree snails, 3-4" long and half that thick, dull chestnut brown mottled.

The hills above Chalamoco are dominated by a fairly large much branched *Cereus*, in places codominant with *Prosopis*. The river is alkaline or saline, with broad salty bed and *Distichlis* flats.

Parotani (2450 m.) is surrounded by an artificial forest of *Eucalyptus* & *Schinus*, planted so regularly that a German must have done it.

Above here the valley narrows, the walls are bushy. Where the slopes are not too steep there are small trees. The bottom is of low woods, mostly *Schinus*. A red-fl'd. *Tecoma* here, too, & *Cortaderia*.

Upward the valley widens out again, the floor with *Salix* & *Schinus* & cult. *Eucalyptus*.

Here is Luti-Collo (2502 m.) at Vinto the r. crosses into the broad cultivated Cochabamba Valley (Rio Rocha)

In the Cochabamba valley, which is broad and flat, *Eucalyptus* is the most conspicuous tree.

The valley appears dry, at this season, and has an aspect almost like Southern California, with dry hills surrounding a flat plain with alluvial fans.

Aug. 20 - Cochabamba to Totora by road. There is a long gradual climb through dry country, to an altitude of about 12000 feet, this is sparse puna - bunch grass. On the way are a few patches of the dry thorn forest that Mayr (see Cardenas) have been the original vegetation of the region.

Before the puna is reached, and on the other side from the puna down to Totora the commonest shrub or small tree is *Polylepis* sp. It does not form a close growth but is abundantly

There are many fruit trees, peaches, pears, & apples. But according to resident Americans only the peaches are good.

scattered. Its trunk becomes about 20 ~~cm~~ cm. thick, covered with a reddish, coppery, exfoliating bark. The trees reach 5 m. Leaves reduced to about 3 flts.

Totora and the road camp at km. near Monte Puncos are about 2800 m. alt.

Wheat is the main product.

Toward Totora the bushy vegetation becomes more luxuriant, but is, of course, badly eaten by sheep.

(45) 100

Aug. 21 - ~~Rio~~ Upper canyon  
of Rio Huairamayu (Rio  
Montepuncu)  
thick <sup>wet</sup> forest on steep  
slopes

28424 *Barradesia polyacantha* Wedd.  
common det. J. Cuatrecasas

6 25

common in brush in  
openings, and near stream

26 *Mutisia lanata* R. & P. det. J. Cuatrecasas  
occasional in brushy  
woods along trail near stream

3 27 *Cajophora*  
occasional in brushy  
woods along trail

✓ Aug. 21 same, above Sihuenca

2 28 *Lipbocampylus*  
rare in brush on vertical  
bank above trail

4 29 *Drymaria*  
along trail

30 *Centropogon*  
common along trail

2700 m. shrub 2 m. tall, arching;  
flowers crimson  
somewhat aromatic  
shrub up to 2 m. tall;  
flowers very pale lavender  
to white. (looks like *Hedyotis*  
superficially). "Muña" <sup>used for</sup> <sup>blowing</sup> <sup>in</sup> <sup>place of</sup> <sup>Origanum</sup>  
vine climbing in  
small trees; heads  
ascending, rays vermillion.  
vine; ~~flowers~~ not  
stinging; flower orange-red.

2600 m.

~~erect~~ vine-like; corolla  
red, column yellowish,  
anthers gray, stigma greenish.  
decumbent, dull-green  
herb.

shrub, flowering from  
1 to 4 m. tall, sparsely branched;  
flowers pale green except  
brownish anthers, faint, elusive  
stems - like a fox-like odor.

✓ 28431

*Nicotiana*

common along trail

✓

32

*Senecio cabrarae* Cuatr. det. J. Cuatrecasas

common along trail

DEB. R. Berry, 1998

✓ 4

33

*Fuchsia boliviana* Corr.

common along trail

✓

34

*Nertera granadensis*

common on open banks

✓

Aug. 21 - same, Chacabambas,  
just below Sihuena

✓

35

*Fuchsia jurtensis* O. Kuntze

brushy banks DET. P.E.

Berry, 1998

1

36

*Smilax*~~flower~~ brushy bank

3

37

*Mimosa*

rare along trail

see below

7

38

*Nertera granadensis*common along trail and  
under trees

7

39

*Corymba*abundant all along  
trail

40

*Corymba*

same

shrubs up to 5 m. tall.  
flowers white tinged with  
bronz-purple.shrub or small tree  
5 m. tall; rays white,  
disk dull whitish.shrub up to 4 m. tall;  
flowers pendent, crimson.  
prostrate; fruits  
red, juicy.

✓ 500 m.

weak, elongate sparsely  
branched shrub, leaves  
just appearing; flowers  
pendent, purple.small vine; flowers  
maroon with yellow anthers.  
flowers purple.

2400 m

prostrate; fruits bright  
red; flowers yellowish  
green.prostrate, forming a  
carpet; flowers deep  
purple, ♀.

same flowers ♂

✓  
24438-40  
go here

Aug. 21 same, Avelan  
Quebrada

brushy forest along river

28441 *Cinchona pubescens* var.

occasional, in small  
groups or "manchas"

42 *Mouningia*  
occasional

43 *Palicourea*  
rare, along trail

44 *Psychotria*  
rare, in shady undergrowth

45 *Fuchsia*  
common

46 *Peperomia*  
rare along base of cliff, by trail

47 *Physalis*  
local at base of cliff

2400 m.

tree 10 m. tall, trunk  
inclined with, erect bands,  
trunk 20 cm. thick;  
leaves dull above, veins  
and petioles green, scarcely  
reddish; stipules erect, green;  
flowers crimson without,  
lobes pink within,  
very fragrant; fruits  
reddish. (bark sample  
from erect branch.)

shrub 2 m. tall, leaves  
dark green; flowers  
deep indigo blue with  
yellow-green throat.

erect shrub 1.5 m. tall; thyrses  
blue-violet, flowers blue.  
erect, 1 m. tall; fruit  
white

weak shrub to 4 m. tall, tending  
to be supported by other plants;  
flowers vermillion.  
fleshy, odorless; spikes  
erect.

herb 1.5 m. tall, branched;  
flowers greenish white.

23443

*Lipthocampylus*

2

rare on cliff by waterfall

7

49

*Cinchona pubescens* var.occasional, this on verge  
of river.

3

50

*Clusia*occasional on cliffs  
above trail

4

51

*Cinchona*occasional in woods  
on walls of ravine above river

10

52

*Cinchona*

same

23444

vine-like; flowers vermillion  
with orange-yellow lobes,  
column yellowish, anthers gray.tree with several  
trunks, up to 12 m. tall,  
30 cm. thick; leaves  
dull to subglossy above,  
veins and petioles green  
to somewhat reddish,  
stipules green, erect;  
fruits immature, reddish.

(bark sample)

lactiferous shrub,  
latex white; fruits  
cream-white.tree 3 m. tall, 1 dm. thick,  
several small trunks;  
leaves dull, slightly  
iridescent above, veins  
and petioles scarcely  
reddish; stipules <sup>some</sup> reflexed  
~~are~~ slightly persistent;  
fruits reddish, immature  
(bark sample.)tree 4 m. tall, ~~2~~ 6 cm. thick,  
branched at base; lvs. same.  
turning red when old. (bark sample)

✓ Aug. 22 - Montepuncos,

brushy slope, mainly  
*Polylepis*, *Gerardia*, *Baccharis*,  
*Piqueria*, <sup>*Gaiadendron*</sup> etc.

28453  
 5

*Gaiadendron*  
 common

3 54 *Baccharis tricusata* L. f. var.  
 common det. J. Cuatrecasas

1 55 *Piqueria*  
 common

3 56 *Polylepis tomentella* Willd.  
 dominant

5 57 *Gerardia*  
 common

The two *Cinchonas* found  
 along Rio Huairamayu are  
 growing together, but show  
 no signs of hybridization.  
 Both seem to be varieties of  
*C. pubescens*. One is more  
 or less the sort found  
 in the countries to the north,  
 with large leaves, somewhat  
 decurrent on the petioles,

shrub 2 m. tall;  
 flowers white, turning  
 dull straw-yellowish,  
 fragrant.

— bush 1 m. tall, flowers  
 yellowish-white.

— bush 1 m. tall, past  
 flowering.

— shrub 3 m. tall, with  
 papery red exfoliating bark.

— shrub 1 m. tall (others  
 taller); flowers rose-  
 purple, orange inside,  
 stamens yellow.

— erect, green stipules, early  
 caducous, crimson, fragrant  
 flowers. The other has smaller,  
 narrower pointed leaves,  
 stipules more persistent  
 and early reflexed. The  
 flowering seasons may  
 be distinct enough to prevent  
 crossing. (The second var.

(28451, 28452) resembles more  
 the northern forms often referred to *C. off.*)

✓

Aug. 23 - Inca Chaca, valley  
of Rio Malaga,

thick wet forest on ~~the~~ and  
near top of bluff

28458

Fuchsia

3

occasional in undergrowth,  
near trail on steep slope

2

59 Fuchsia

occasional in second-growth  
brush on steep slope

3

60 Calceolaria

common in undergrowth  
on steep slope

5

61 Vaccinium

occasional in thin woods  
at top of bluff

14

62 Cinchona

occasional in <sup>decadent</sup> ~~thin~~ woods  
at top of bluff

5

63 Cinchona

same

2500 m. (e.)

shrub 1.5 m. tall; flowers  
in pendent racemes,  
hypanthium dull  
flesh-bronze, corolla  
red.

shrub 1.5 m. tall;  
flowers scarlet.

scrambling herb  
up to 2 m. long; flowers  
yellow.

semi-scandent, probably  
epiphytic

3 cm. thick  
small tree 4 m. tall;  
leaves badly eaten by a  
hairy lepidopterous larva  
deep purple beneath, dull  
green above; fruits reddish  
green. (bark sample)

small tree 5 m. tall,  
4 cm. thick; leaves  
dull green above, bronze-  
purple beneath; fruit greenish.  
(bark sample).

- 28464 *Palicourea*  
occasional at top of bluff
- 65 *Mikania*  
occasional in forest on  
top of bluff
- 66 *Cinchona*  
occasional in woods  
at top of bluff
- 67 *Cinchona*  
rare (this form) in woods  
near top of bluff

A wide forested bench  
about 150 m. above floor  
of valley, has *Cinchona* on

- 68 *Fuchsia*  
occasional at top of bluff
- 69 *Corynula pilosa*  
common along trail

shrub 2.5 m. tall;  
fruit immature.  
rare, flowers white.

sterile sapling 4 m.  
tall; leaves dull green  
above, purple beneath  
(bark sample).

tree 12 m. tall, 25 cm. thick;  
leaves dull green  
above and below; buds  
(rare) crimson-pink outside;  
fruits ~~orange~~ reddish-  
bronze. (leaves badly  
eaten by a hairy lepidop-  
terous larva) (bark  
sample)

cliff but not on flat top  
except near edge. Two forms,  
one with leaves green, the other (more  
common) purple, beneath.)

practically leafless,  
flowers purple, pendent.  
prostrate, forming a  
carpet along trail; flowers  
♀, green (mostly sterile)

Aug. 24 same  
wooded sides of deep ravine of  
river cut in flat bed of  
valley. Second-growth  
bushy woods, with  
*Escallonia*, *Myrica*, etc.

28470 *Baccharis venosa* (R. & P.) DC. det. J. Cuatrecasas  
common on steep rocky  
slopes

7 71 *Borreria*  
weedy side of trail

7 72 *Escallonia*  
common on steep slopes

7 73 *Myrica*  
common on steep slopes

5 74 *Clethra*  
occasional on steep slope

2 75 *Gaultheria*  
common in bush on ridge

1 76 *Arenaria*  
common along trail

5 77  
rare on vertical earth bank

5 78 *Gaultheria*  
common in bush on ridge

2300.

2400 m. (E)

This valley seems to have  
been rejuvenated twice, leaving  
broad benches both times.  
The bottom of the ravine  
~~is~~ is a narrow twisted  
gorge only a few m. wide,  
through which the river  
rages, carving the compact  
sedimentary rock into  
bizarre forms.

erect bushy herb 1 m. tall,  
very bitter, said to be  
used as remedy for fevers.

erect, up to 1 m. tall,  
flowers white.

small tree 4 m. tall;  
flowers white.

shrubby tree 4 m. tall.

shrub 1.5 m. tall.

shrub, up to 0.6 m. tall;  
flowers pink; fruit black.

prostrate; flowers  
white, petals entire.

short scandent; ~~to~~  
spathe greenish yellow,  
spadix green, turning yellowish.

shrub up to 0.4 m. tall; flowers  
pale pink, fruit black

18479

*Diagryndrium*

occasional on steep ridge

7

80

common

81

rare

2

82

*Galium hypocarpium* (L.) Benth.

rare on steep ridge.

7

83

*Fuchsia*

occasional on steep slopes

2

84

*Cinchona*occasional on steep slope  
just above rim of gorge.

5

85

*Vernonia*

common in brush along trail

15

86

*Fuchsia*common in brush along trail  
and near electric plant

6

87

*Fuchsia*common in brush near  
electric plantcaespitose, erect; flowers  
yellow, ephemeral.suffrutescent herb or  
shrub up to 2 m. tall.rays bright deep yellow,  
disk dark brown.shrub 0.3 m. tall; flowers  
scarlet.vine-like, 2 m. long, climbing  
in bushes; fruit orange, fleshy.erect shrub, up to 1 m. tall;  
flowers scarlet-vermillion.Tree 10 m. tall; leaves dull,  
green above bronze-purple beneath,  
~~tree~~ stipules soon reflexed;  
(tree in fruit, leaves badly  
eaten by insects; only  
specimens secured were from  
trunk-sprouts, as others  
fell in river) (bark sample).scrambling shrub,  
flowers purple, heads  
secund.erect shrubs 1.5 - 2 m. tall,  
(specimens from several); flowers  
deep crimson; fruit very large.erect shrubs 2 m. tall;  
flowers in pendent cory-  
mbes, dull crimson; fruit  
black, glossy.

same.

✓ Aug. 24 - slopes above electric plant (brought in by local people)

28488 Cinchona

occasional in woods.

3 39 Tropaeolum

occasional

✓ Aug. 24 - steep side of valley near head of Rio Málaga, above Inca Chaca, steep, wet, thickly wooded slopes, cloud-forest.

90 Nertera granadensis (L.f.) Presl  
common on banks and cuts along trail

91 Centropogon  
rare on steep slopes

92 Galium

↑ rare on vertical bank

leaves green beneath;  
with reddish veins, stipules  
reddish when reflected.

vine with flowers firm,  
waxy in texture, ~~red~~ crimson-  
magenta, with maroon  
scales (petals?) in mouth;  
fruit green, very pungent  
to taste.

These slopes are of shist. There  
have no cinchona, as far as seen.  
270 m. (20) and few Rubiaceae except Galium  
& Nertera.

prostrate, flowers greenish-  
yellow, fruit scarlet,  
juicy.

shrub, branched from near  
base, 1.3 m. tall; calyx  
bronz; corolla dull red,  
column red, anthers blackish  
with purple hair, stigma  
dull pale greenish.  
prostrate.

✓ Aug. 27 - slopes west of La Cumbre,  
Prov. La Paz

"puna" ~~dry~~ meadows

28493

Werneria

1  
5

94

Pyrenophyllum  
common

✓ Aug. 27 - same, east of La Cumbre  
Prov. Nor Yungas

puna, ~~dry~~ loose shale  
slopes.

5

95

Stipa

common

3

96

Stipa

common

2

97

common

3

98

Pyrenophyllum

common locally

1

99

~~occasional~~

28500

Senecio adenophylloides Sch. Bip. det. ~~Centrosea~~  
common

1

01

occasional

✓ Aug. 27 Unduavi, Rio ~~Yungas~~  
Prov. Yungas  
steep rocky slope with sparse brush

4500 m.

<sup>hard flat</sup>  
dense cushion plant, fls. white  
dense soft cushions.

4600 m.

dense tufts

dense tufts

tufts.

soft <sup>flat</sup> cushions

dwarf much branched shrub,  
flowers dull yellow.  
tufts.

3100 m.

16° 16' S

67° 55' W.

1947 Bolivia

28502

common

03 *Gaillardia*  
common57 Aug. 27 - Chuspipata, Rio  
Corico

road cuts on steep cliffs

4 04 *Nertera granadensis*  
common2 05 *Lycopodium*Valley of Cupulani  
✓ Aug. 27 - Rio Corico, drainage  
Chuspipata, Prov. Nor Yungas  
Wet brushy woods on steep  
slopes.6 06 *Lymbolanthus*  
in dense brush4 07 *Cinchona*  
side of trail✓ Aug. 27 - Sacramento Chico,  
Valley of Cupulani, Rio Corico  
drainage Nor Yungas  
side of brushy wooded ravine08 *Cinchona*

"quina paile" or

Nor Yungas

suffrutescent herb up  
to 1 m. tall; flowers deep crimson  
shrub 2 m. tallprostrate; flowers  
yellow, fruits red, juicy.

2000 m.

shrub 1.5 m. tall,  
flowers a beautiful rose,  
marked with whitish.  
sapling 1 m. tall, sterile,  
"quina naranjada" leaves  
more or less glossy above.

1900 m.

sprouts from old stump, 4 m.  
tall, flowers pale pink, fragrant,  
leaves deflexed. fruit  
immature (bare sample)

"paile paile"

- ✓ (5) Aug. 27 - Rio Corvico, 5 km. above  
Corvico, Prov. Mo Yungas  
steep brushy side of valley  
28509 *Cinchona calisaya* var.  
in brushy ravines

- 10 *Cinchona calisaya* var.  
"quina calisaya lamuda"  
brushy slope. common

Aug. 27 - 4 km. above ~~Corvico~~  
out in valley of Rio Corvico.  
Mo Yungas

- steep walls of valley  
around banana plantation  
11 *Cinchona calisaya* var.  
planted abundantly

The drainage of Rio Corvico  
well above Corvico is wet, steep  
walled and densely wooded.  
The rock seems to be sediment-  
ary. The road from La Paz  
enters the valley above  
Chuspipata, at about 3000 m.

1750 m.

slender shrub 4 m. tall.  
(like 28510 but hairy)  
(leaves badly attacked  
by insects) (bark sample)  
shrub 3 m. tall, several  
stems from base,  
leaves turning red.  
(bark sample - lower bark  
had been removed and  
regrown)

1700 m.

shrubs 2 m. tall,  
fruiting

in a zone of elfin forest and  
Chusquea. This rapidly  
becomes typical dense  
cloud forest. At least near  
the road this is fairly well  
choked with Chusquea and  
vines, probably the result

of the road construction.

At about ~~2100~~<sup>2100</sup> m. appears a variety of *Cinchona pubescens*. young plants are very common in the brush along the road, but mature ones rare - only two seen ( ).

It is probably *C. ovata* Wedd. or something close to it. It differs from the Cochabamba form (28484, 28488, etc.) in the erect, early caducous stipules, glossy leaves, etc. At about 1900 m. this is replaced by another variety of *C. pubescens* & "quina paile" which has long leaves, acute at both ends, tending to be pendent or deflexed, coarsely pubescent. No large plants of this were seen, but some small ones were flowering.

Near where Cupulani valley enters the main Crovis valley, the forest disappears, having been cleared and burned, replaced by coca and banana

plantations and second-growth brushy slopes.

In this brush *C. calisaya* is frequent as small bushes, up to 4 m. tall. It occurs both as a smooth, and a tomentose form, otherwise more or less identical.

Around banana plantations this has been largely preserved and ~~now~~ abundantly planted. There are small trees, flowering and fruiting abundantly when only 2-3 m. tall - probably because they are out in the sun. Besides the tomentose "<sup>calisaya</sup>quina ~~lanudi~~" form mentioned above, local quineros recognize a "quina calisaya blanca" with smooth green leaves and pink flowers, and a "quina calisaya morada" with <sup>leaves purple beneath and</sup> white flowers. The leaf shape varies considerably, but is generally narrow and with an obtuse apex. All are harvested and considered more or less equal in bark quality.

It was noticed that flowering plants were much easier to peel than fruiting ones, and this was confirmed by

✓ Aug. 28 - Coroico. *Mar yungas* planted in and around edges of banana plantation on slope.

28512 *Cinchona calisaya*  
common

15 13 *Cinchona calisaya*  
common

8 14 *Cinchona calisaya*  
uncommon, edge of ravine

3 15 *Cinchona calisaya*

*Mar yungas*

the quince who served as guide.

16° 9' S

67° 45' W.

shrubby tree 2.5 m. tall; flowers fragrant, pink outside, pale shell-pink within. "quina calisaya blanca".

same, ~~fruit without fls.~~  
and ~~well-immature fruit~~.

(bark sample)

shrub 3 m. tall, several stems; leaves bronze-purple beneath, flowers said to be white, but not seen; fruit immature. "quina calisaya morada" (bark sample).

shrubby tree 3 m. tall, very heavily fruiting, most of leaves red, ready to fall. ~~some bark~~ has been removed some time back "quina calisaya blanca" (bark sample)

28516 *Cinchona calisaya*

17 *Drymaria cordata*  
along trail at base of wall

18 *Cinchona calisaya*

✓ (57) Aug. 28 - Valley of Cupulani,  
below Chusquea, Rio Croico  
Drainage, Mta Yungas  
wet cliffs and dense  
Chusquea filled forest.

5 19 *Deeringia*

20 *Cinchona pubescens* var.  
in on steep side of ravine

5 21 *Centropogon*  
steep bushy cliff

4 22 *Fuchsia*  
wet cliff

5 23 *Fuchsia*  
wet cliff, and ravine  
common

shrubby tree 2.5 m. tall,  
flowers pink without,  
pale shell pink within,  
flowers white.

shrub 2.5 m. tall; leaves  
green, fruit immature.  
"quina calisaya blanca".

vine climbing in trees  
tree 12 m. tall, 25 cm. thick;  
leaves glossy, oldest  
ones turning red.

"quina nanajada" ~~hakun~~  
scandent; flowers  
magenta, column greenish  
yellow, anthers black.  
pendent shrub; flowers  
crimson.

elongate shrub; flowers  
scarlet.

1947 Bolivia

all day

✓ (59)

Aug. 28 - high on side of  
Valley of Rio ~~de Lengas~~ <sup>Urduani</sup>, road  
to Corvico, 2 km. below Urduani

Mn Yungas

vertical road cut in  
brushy vegetation

28524

#

Gaultheria

common

1

25

Vaccinium

very common

4

26

Gaultheria

very common

27

Pernettya

common

✓ (66)

all day

↓

Sept. 4 -

pass at head of Quebrada de

Zongo

great <sup>granite</sup> rocks with patches of  
soil between them, thin <sup>scattered</sup>  
snow on ground. Vegetation  
typical puna, with thin  
grassy turf, some tufted  
grasses. Also cliff with granite talus.

28528

2

Valeriana

rock crevices and ledges

1

29

Lupinus

rock crevices, rare

Mn Yungas

16° 15' S

67° 47' W

15000

small shrub, racemes

red, flowers rose pink.

prostrate; flowers deep

rose red.

shrubs from 1 dm to 3 dm. tall,

flowers purplish pink, fruit black.

dwarf shrub, fruits

pale purple.

5196 m.

flowers purplish white

22530

3 31 *Distichlis*  
common in rock crevices  
on gravelly patches of  
decomposing granite

2 32  
patch of earth between rocks  
2 33 *Rytenophyllum*  
common on earth patches

1 34  
in rock crevices

1 35  
rock crevices with earth  
3 36  
common everywhere

1 37  
common locally

2 38 ~~area~~  
occasional  
1 39 *Luzula racemosa* Desv. det. Balsaer. 1984  
common in open

1 40 *Cerastium*  
occasional on cliff

1 41  
common locally

4 42 *Luzula*  
common on cliff and talus

2 43 *Luzula racemosa* Desv. det. Balsaer. 1984  
rare on cliff

tufts and cushions

dwarf-shrub; flowers  
dried.

flat yellow cushions

forming turf

flowers white

dense tufts

- 27544 *Hipha*  
3 ~~granite~~ talus
- 3 45 *Lilene*  
rare on cliff
- 46 *Chersodoma antennaria* (Wedd.) Cabrera det. J. Cuatrecasas  
occasional on cliff
- 5 47 *Senecio adenophylloides* Sch. Bip. det. J. Cuatrecasas  
common on talus
- 12 48 *Hipha*  
common on talus
- 1 49 *Lycopodium*  
rare on cliff
- 2 50 *Bomarea*  
rare on cliff
- 13 51  
common on cliff
- 2 52 *Asplenium*  
in crevice under overhanging rock
- 5 53  
common on cliff

(61) Aug Sept. 2-3 - quebrada de  
Zongo 2-4 km. above Zongo  
steep wet wooded  
canyon side.

- 3 54 *Escremis*  
rare

dense bunches

flowers red

*Quatrecasas* prostrate, matted

*Quatrecasas* shrub up to 4 dm. tall,  
bushy, ~~flowers~~ aromatic  
flowers yellow.

dense stiff bunches

flowers coral red with  
green tips.  
dense bunch

forming dense cushions

flowers purplish blue;  
fruit immature

- 28555 *Myrsine*  
5 bushy trail-side
- 2 56 *Fuchsia*  
~~shrub~~ bushy trail-side
- 5 57 *Palicourea*  
wet bushy trail-side
- 58 *Gaultheria*  
~~dry~~ open bushy slope
- 4 59 *Vaccinium*  
open bushy slope
- 2 60  
common along bushy trail-side
- 13 61 *Phyllanthus*  
rare along trail
- 2 62 *Galium hypocarpium* (L.) Benth.  
rare along trail
- 5 63 *Hipocampylus*  
occasional in bush along trail.
- 7 64 *Cinchona pubescens* Walp. var.  
common locally

shrub 3 m. tall

shrub 1 m. tall,  
flowers pendent coral-  
vermillion with greenish-  
tipped calyx-lobes

shrub 1.5 m. tall;

thyrses pale greenish,  
flowers straw-yellow

shrub 1 m. tall;

flowers <sup>rose</sup> pink; fruit black.

shrub 0.6 m. tall;

flowers red with  
white tips.

vine-like; flowers  
and bracts white.

slender shrub 0.8 m.  
tall.

vine-like; flowers  
dark red, fruit orange-red.

spreading shrub; flowers  
red

small tree 5 m. tall;  
leaves turning red in age, more  
or less glossy; fruit dry.  
(leaves variable in size  
on different trees, this one small.)

1947 Bolivia

28565

8

*Cinchona pubescens* var.  
canyon bottom

✓

Sept. 4 - Yungo

28566

7

*Cinchona calisaya*  
planted in banana patch,  
on steep slope (from plant  
in forest below).

#

67

*Drymaria*  
weed in village, common

✓

June

Sept. 5 - La Paz, Bolivia  
cultivated in parks and gardens

14

68

*Cantua busifolia*

7

4

69

*Cantua busifolia*

6

70

*Cantua busifolia*

1

71

*Lavatera assurgentiflora* Kell.  
commonly cultivated and  
spontaneous in gardens.

tree 12 m. tall; leaves  
more or less glossy;  
fruit damaged by insects.  
(bark sample)

1500 m.

tree 8 m. tall, 12 cm. thick;  
flower pink, mostly sterile  
(bark sample)

diffuse; pedicel, viscerous

"cantuta"

erect shrub, flowers  
yellow, limb paler than tube;  
stigma exserted from bud.

erect shrub; flowers  
with orange-red tube

"cantuta"

and crimson limb  
stigma exserted from bud.

erect shrub 2.5 m. tall;  
flowers crimson, tube  
redder than limb, (more  
slender than in nos. 28568-9)

"cantuta".

shrub 1.5 m. tall, trunk thick;  
flowers rose with white  
center and narrow stripes.

- 28572 *Ligustrum*  
commonly planted
- 73 *Cassia tomentosa* L. f. <sup>det. Powell</sup> *lancea micropandulosa* (Poepp.) B. <sup>det. B. B. B.</sup>  
planted and spontaneous
- 74 ~~Veronica~~
- 74 *Veronica*  
commonly planted
- 75 *Buddleja*  
commonly planted (apparently  
native to region)
- 76 *Lavatera assurgentiflora* Kell.  
spontaneous in garden
- Sept. 6 - ~~Pto~~ Canyon of  
Rio La Paz, 1-2 km. below  
La Paz,  
cliffs and steep slopes of  
partially consolidated  
gravel, seriously eroded.
- 77 *Tecoma arequipensis* (Sprague) Sandw.  
common <sup>det. A. Gentry 1974</sup>
- 78 *Tecoma arequipensis* (Sprague) Sandw.  
common <sup>det. A. Gentry 1974</sup>
- 79 *Prunus serotina* var.  
occasional

- small tree 4 m. tall;  
buds white.
- small tree 3.5 m. tall;  
flowers said to be yellow;  
pods said to be eaten  
occasionally, as they are sweet.
- shrub 1 m. tall; flowers  
purplish at first, turning  
white.
- shrub 2 m. tall (but  
reaches small tree size);  
flowers orange.  
"keshuara"
- shrub flowers rose-pink  
with white centers and  
maroon stripes.
- shrub 2 m. tall, sparsely  
branched; flowers dull <sup>orange-</sup>vermillion.
- shrub 1.5 m. tall, sparsely  
branched; flowers dull <sup>orange-</sup>vermillion.
- Tree 6 m. tall; flowers  
white; fruit immature,  
said to be very sweet and  
edible when ripe.

- 23580 *Cassia tomentosa* L.f. det. Powell  
 6 common *leaves multiglandulose*  
 (Jacq. 1793)  
 det. Barnabe
- 5 81 *Oenothera rosea*  
 occasional
- 1 82 *Matricaria chamomilla*  
 occasional weed
- 4 83 *Senecio clivicolus* Wedd. det. J. Cuatrecasas  
 common
- 1 84  
 common at base of slopes
- 1 85  
 occasional on dry talus
- 1 86  
 weed at edge of cultivated field
- 3 87 *Mutisia acuminata* R. et P. det. J. Cuatrecasas  
 common
- 6 88 *Mulalenbeckia*  
 common

- shrub 1.5 m. tall, flowers  
 yellow; fruit immature.  
 prostrate, branched at  
 base; flowers rose-purple.  
~~sa~~ aromatic. rays white,  
 disk yellow. "manzanilla"  
 used medicinally.
- branched low shrub;  
 flowers bright yellow.  
 erect & tangled.
- flower yellow with a  
 green stripe outside each  
 segment, wider on outer  
 segments.
- leaves green, fleshy;  
 flowers green.
- low shrub, up to 1 m.  
 tall, rays vermillion,  
 bracts black-purple.  
 "chinchiriconá".
- low weak shrub; flowers  
 green, ripe fruit black, fleshy,  
 used for coloring fabrics.

1947 Bolivia

Sept. 7 - trip by air from La Paz to Oruro, Cochabamba and Santa Cruz.

To Oruro is mainly over altiplanos - dry, bare and almost completely under cultivation except where ~~are~~ there are alkaline or saline flats, or where erosion has formed dendritic patterns of gullies.

From here east to Cochabamba and far beyond are range upon range of dry, brown, bare hills, also largely under cultivation or overgrazed.

Finally, to the eastward, the hills begin to darken with a thin brush that indicates the approach of the wetter eastern slopes. Then comes a broad band of completely green lower hills, obviously

Sept. 7 - Santa Cruz, Dept. de Sta Cruz

28589

Datura

cultivated in park

Santa Cruz

formed of warped and eroded sedimentary beds, densely wooded on all except the broken off steep faces which show their pink and dark bedding through a thin grassy or bushy vegetation. The crests of the ridges are largely bush-covered rather than wooded, too.

This flattens out into the plain on which Santa Cruz is situated. This has largely been denuded though just east of the hills is an expanse of palm forest. Second-growth woods is common, though most of the land is cultivated.

circumscissile.

/ calyx prismatic, slightly plicate, bushy shrub 2 m. tall; flowers white, open only at night "diego de noche".

285.90

*Diastatea*

weed with potted plants

2

91 *Apium*

weed with potted plants

4

92 *Cestrum*~~wine~~ climbing on pergola  
in arbor, probably planted

1

93 *Gnaphalium*

weed with potted plants

↑

The cultivated plants  
of Santa Cruz are the  
common tropical ones.

Particularly noted were:

*Washingtonia filifera**Phoenix* sp.*Datura* sp. (28589)*Melissococca bijuga**Citrus* (various spp.)*Eugenia cauliflora*(delicious black fruit the  
size of a large cherry)*Murraya paniculata*(called *Jasminum officinale*)*Plumbago auriculata**Cestrum* sp. (28592)*Enterolobium cyclocarpium**Monstera* sp.?*Cycas revoluta* (one garden)

flowers purplish

vine several m. high;  
fruits black.*Cordyline terminalis*

a large yellow bamboo.

*Mangifera indica**Peara americana**Ficus pumila**Cochlospermum* sp.?~~Cecropia~~ *Cecropia* sp. (bottle shaped)*Zelkova pendula**Acrocomia* sp.?*Catharanthus roseus**Plumeria rubra**Cecropia* sp.(fruit said to be delicious  
and free from ants)*Musa sapientum**Codiaeum variegatum**Asparagus plumosus**Asparagus sprengeri**Cupressus sempervirens**Criminum rubrum**Carludovica palmata*

Sept. 8 - Trip from Santa Cruz to Bermejo, Rio Pirai  
 Flat sandy plains with tall second-growth brush, with *Tecoma* very conspicuous, also a green-leaved, shrubby white-flowered *Solanum* and a *Pereskia*. *Cereus peruvianus* (?) occasional. Many other shrubs and vines. The sand appears to have very little humus in it.

Approaching the mountains palms become very abundant, finally the dominant note in the ~~flora~~ vegetation. Also scattered tall trees appear, apparently left in clearing. Cultivated plots are scattered.

After passing the first range of hills the road is in a broad inner valley, and the palms disappear. The forest becomes drier and dominated by legumes.

Patches of tall trees are common here. The hill slopes become covered by what appear to be deciduous trees just starting to leaf out. For a while the valley is quite dry. At about Angostura it becomes wetter and *Cecropia* becomes common. But it is still rather dry forest in most places.

Several large *Solanums*, *Urera laciniata*, several Malpighiaceae vines, *Tecoma*, etc. besides various leguminous shrubs and trees are common. Beyond Angostura the terrain is hilly, of a soft pink and white conspicuously bedded sedimentary rock, the beds varying greatly and much warped.

don't

✓ (4.8)

Sept. 8 - Bermejo, valley of  
Río Pirai (Rio Bermejo)  
A weedy brushy bluff  
of sediments over ravine  
of river.

28594

*Leucaena stans*

7

occasional in fence-row

*Stylosanthes*

det. Moldenke

4

95

*Pithecia virgata* var. *elliptica* (Braz.) Mold.~~Stylosanthes~~ common in brush

3

96

*Calyptrata* H.B.K. det. Fryxell

common weed

5

97

*Heliotropium transalpinum* Vell.

common in brush

4

98

*Lantana aristata* var. *cubensis* Moldenke det. Moldenke

occasional on bluff

4

99

*Alternanthera flavogrisea* (Wrb.) Wrb.

common weed in small

openings on top of bluff

28600

*Randia*occasional on top of bluff  
in brush

From here the hills  
seem uniformly wooded  
to the tops with the  
same type of deciduous  
forest, just leafing out.  
The lower slopes just

tree 6 m. tall; flowers  
bright yellow with  
fine red lines in throat.  
shrubs 1 - 2.5 m. tall.

suffrutescent herb  
up to 0.7 m. tall.

shrubs 0.5 - 1.5 m. tall;  
flowers white.

weak shrub 1 m. tall;  
flowers pinkish white.  
prostrate, rather  
dense.

shrub 2 m. tall;  
flowers greenish-white.

above the flat bottom are  
planted to bananas.

1947 Bolivia

28601

*Solanum tripartitum* Kunth  
 dooryard Det. H. G. L. H. S.

I

S. cf. *radicans* L.f. det. M. Nee, 1982

✓ (51)

Sept 9 - Tres Cruces,  
 above Bermejo, north of  
 Rio Pirai (Rio Bermejo)  
 dry second growth with  
 open grassy areas on  
 slopes and crests  
 has been severely burned

4 02 *Guicthamorus azafra* Cabrera fma. *intermedia* det. J. Cuatrecasas

rare in second growth brush

4 03 *Lippia dumetorum* Herzog

common in low brush

5 04 *Onoseris sagittata* (Rusby) Rusby det. J. Cuatrecasas

in shade at foot of cliff

5 05 *Calceolaria*

wet seeps and cracks in  
 cliff

3 06 *Eupatorium*

brushy ridge

Santa Cruz - Florida

prostrate, rooting  
 at nodes, extensive,  
 forming dense mat; flowers  
 white; fruit immature,  
 not spherical, wider  
 one way than other.  
 used in medicine to  
 remove meconium from  
 new-born infants - pounded  
 and used as infusion.

"melendre"

erect shrub 1.5 - 2 m. tall;  
 head, brilliant orange.

slender aromatic shrub  
 1.5 m. tall; flowers white.

flowers magenta.

flowers bright yellow.

flowers bright purple,  
 involucre tipped with  
 deep purple.

- 28607 *Piqueria*  
common on bushy ridge
- 5 08 *Gouania*  
occasional in second-growth
- 8 09 *Cinchona pubescens* var.  
common very locally  
on bushy ridge;  
plants have apparently  
survived severe burning
- 6 10 *Cinchona pubescens* var.  
same
- 5 11 *Justicia rusbyana* Lindau det. D. Wasshausen 1969  
on bushy ridge, common
- 3 12  
common tree on slopes  
and bushy ridge, but  
mostly sterile.
- 3 13  
rare on dry eroded slope

- slender shrub up to  
1 m. tall, flowers cream  
white, very fragrant.  
vine climbing in trees,  
tough; fruit immature.  
tree 4 m. tall, partly  
dead, several small  
trunks up to 7 cm. thick;  
leaves firm, reddish  
green, stipules erect &  
spreading; fruits  
dull red, immature;  
(bark sample).
- mass collection of several  
sterile clumps of  
sprouts, the tallest  
1.5 m. (keep all.) (To show  
lack of variation except  
in leaf size.)
- erect herb to 1 m. tall;  
flowers white, with  
r folds in lower lip that  
are striped with purple,  
tree with thick gray  
ridged bark; leaves  
glossy; flowers waxy  
white, fruit dry.
- shrub 1 m. tall, nearly  
leafless; flowers white.

1947 Bolivia

28614

occasional weed

5 15 Ruellia longipedunculata Lindau det. D. Wasshausen 1969

rare on eroded open slope

5 16

common on bushy slope

(48)

5

Sept. 19 Bermejo  
around dwellings

3 17 Bruneria

uncommon in grassy place

5 18 Amaranthus hybridus L.

common weed

5

19

on <sup>weedy</sup> earthy terrace above river  
Gaya det. Fryxell  
Abutilon

common weed

Gaya Cruziana Krapov.

det. L.J. Dow Jan. 1997

20 Portulaca

occasional weed

21 Richardia brasiliensis Gomes

rare weed

det.  
1976

Santa Cruz - Florida

flowers white.

sub-shrub up to 1 m.  
tall, flowers dull red,  
tube lighter.shrub 1.5 m. tall,  
flowers purple, calyx  
grayish purple.  
"higilla"

flowers white.

erect.

suffrutescent herb up to  
0.7 m. tall; flowers white,  
delicate, with purple  
center, purple filaments,  
yellow anthers, red styles.  
fleshy, flowers dull ~~pink~~  
pink with deeper center,  
about 1.5 cm. across, stamens  
about 10 <sup>red</sup> style branches  
yellow, 5-6.prostrate; flowers white  
corolla lobes 4-5.

28622

*Portulaca*  
occasional  
~~weed~~

1 23

*Delilia biflora*

rare weed (one seen)

2 24

*Boerhavia*

occasional weed

1 25

*Portulaca*

rare weed

2 26

*Boerhavia*

common weed

3 27

*Portulaca*

locally common weed

6 28

~~Boerhavia~~ *Jungia divaricata* Rusby det. J. Cuatrecasas  
common along roadsides

63

29

*Jacobinia brevispica* Leonard

det. D. Wasshausen 1969

occasional in bush

2 30

*Clematis*

in bush along road

fleshy; flowers <sup>clear</sup> yellow,  
2 cm. across; stamens many  
(over 25), <sup>yellow</sup> style branches <sup>6-7</sup> yellow.  
flowers yellow.

prostrate to ascending,  
flower pink.

fleshy, flowers pale  
straw yellow, ~~style~~ stamens  
10-12, filaments yellow,  
anthers orange-red; style  
branches 6-8, yellow.  
flowers white.

fleshy, leaves more or less  
pressed into one plane;  
flowers crimson-pink,  
7-8 mm. across, stamens  
about 15, red with yellow  
anthers; style branches  
6-8, deep crimson, twisted  
into two irregular masses.  
shrub up to 7 m. tall;  
flowers white.

spreading elongate  
herb, flowers yellow  
fading distally to straw color.  
vine; flowers greenish  
white.

1947 Bolivia

- 28631 *Croton*  
4 common in bush
- 5 32 *Graphalium*  
common weed
- 5 33 *Senecio pectioides* Rusby det. J. Cuatrecasas  
road cut in earth
- 3 34 *Tricachne insularis*  
common weed
- 5 35  
common weed on earth banks
- 3 36  
occasional weed
- 3 37 *Phypalis*  
occasional weed
- 1 38 *Ageratum conyzoides*  
occasional weed
- 2 39 *Urtica*  
occasional weed

According to subprefects of Samaypata there is quina in various localities around Samaypata. The trees are not necessarily small, but reach several dm. diam.

In former times it was worked, at least to some extent

Santa Cruz - Florida

shrub 2 m. tall. fls. leaves turning red in age; fls. yellowish-white.

branched suffrutescent herb up to 0.8 m. tall, flowers yellow.

loose bunches up to 1 m. tall.

prostrate, gray-green.

flowers yellow

flowers greenish yellow, with dull green center. aromatic herb, flowers pale lavender.

branched herb, pale green.

The small stature of nos. 28609-10 is doubtless due to burning. It is said only to grow on ridges and rocky places, never on flat places.

Postervalle, Miranda, San Juan were mentioned as localities.

1947 Bolivia

28640  
4

Mikania

occasional in sparse brush

8

41

Lolium

occasional

1

42

Panicum

rare, growing up through a dense spring shrub

1

43

Rivina humilis

occasional weed

I

group of

✓

(75)

Sept. 11 - Rio Bermejo (Ristiri)  
about 1-2 km. above Angostura,  
Pr. Florida, Dept. Sta CruzCliffs of soft shale above  
river, weedy roadsides  
and cuts.

1

44

Plumbago

weedy roadside

6

45

~~Plumbago~~ on rocky cliff

4

46

Schinus

common in woods below road

2

47

common in bushy woods

1

48

Alternanthera

occasional on rocks

5

49

Ruellia graciliana Baker. (var. aff.)  
common along road

Santa Cruz - Florida

herbaceous vine; flowers  
cream white.spreading tree 4 m. tall,  
3 dm. thick; cymes erect,  
flowers purple, nodding.flowers pinkish white,  
fruit red.depressed plant, sprawling,  
flowers white.vine, flowers grayish  
white.slender tree 5 m. tall,  
absolutely bare except for  
clusters of green fruits.extensive tough vine,  
flowers bright yellow, one  
petal marked with red.  
heads whitish.plants up to 1 m. tall, corolla  
scarlet, somewhat plicate, <sup>pentafid junction</sup> of throat and tube.

1947 Bolivia

28650

Turnera

1

rare on rocks

2

51

*L. Wissadula boliviana* R.E. Fries det. Fayxell

rare on rocks

3

52

*Onoseris sagittata* (Rusby) Rusby det. J. Cuatrecasas

I

rare on rocks

all done

✓ (75)

Sept. 12 - Santa Cruz

3

53

*Pogonopus tubulosus* (DC.) Schum.  
cultivated in park

1

54

*Borreria*

weed with potted plants

3

55

*Nicotiana*

weed with potted plants

✓ (75)

Sept. 16 - Canyon of Rio Choqueyapu (R Chuquiyagillo)  
above La Pazeroded steep dry grassy  
slopes of coarse gravel,  
dominated by *Stipa*, *Baccharis*,  
and in places *Lupinus*.

16° 33' S

68° 8' W.

3750 m

6

56

*Solanum*

common, mostly in mountain places

Santa Cruz - Florida

~~La Paz~~ - La Paz

flowers deep yellow.

bushy, up to 0.7 m. tall;

flowers orange.

flowers bright purple.

Spreading tree 5 m. tall; flowers  
purple distally, green  
below, expanded  
calyx-lobe bright rose-pink.  
"quina".

flowers white.

flowers green, slightly  
bronzed.shrub 1 m. tall; leaves  
glossy, of a dull green color;  
flowers violet, fruit black  
when ripe.

- 28697 *Baccharis papillosa* Rusby det. J. Cuatrecasas  
common
- 58 *Lupinus*  
common
- 59 *Baccharis papillosa* Rusby det. J. Cuatrecasas  
common
- 60 *Baccharis papillosa* Rusby det. J. Cuatrecasas  
common
- 61 *Galium*  
rare on <sup>bare</sup> eroded gravel bank
- 62 *Muehlenbeckia*  
common locally on  
bare gravel
- 63  
common
- 64 *Tetraglochin*  
occasional
- 65 *Baccharis incarum* Wedd. det. J. Cuatrecasas
- 66 *Baccharis* " " " "  
very common

## La Paz - La Paz

- dwarf shrub; flowers  
whitish.
- small shrub; flowers  
blue, with center of  
banner bright yellow  
turning to purple distally.  
(mostly not yet in flower)
- dwarf shrub, 0.5 m. tall
- dwarf shrub, 0.5 m. tall
- prostrate, purplish;  
fruit fleshy, white.  
prostrate.
- small shrub, up to  
1 m. tall, aromatic;  
flowers white.  
"munia" <sup>said to be</sup> used for stomach  
medicine.
- fruit dry, easily dropped.
- dwarf shrub 0.4 m. tall;  
flowers whitish

1947 Bolivia

✓ (59)

Sept. 17 - Rio Unduavi, about  
10 km. below Unduavi  
steep wall of ravine above  
river, dense Chuaquea-filled  
woods.

2000 m. (e)

28667

*Cinchona pubescens* var.  
occasional

9

68 *Cinchona pubescens* var.  
occasional

✓

Sept. 17 Rio Unduavi 10 km.  
below Chaco

1700 m. (e)

69

*Cinchona calisaya*  
around edges of banana  
and coffee plantations

16° 21' S

67° 51' W

bushy tree 5 m. tall, with  
several trunks; old leaves  
red.

✓ (55)

Sept. 17 - just west of Chulumani

16° 23' S

67° 34' W

steep brushy slopes, full  
sun

✓

70

*Cinchona calisaya*  
edge of banana plantation

9

71

*Cinchona calisaya*  
in bush

✓

72

*Condaminea corymbosa*  
common in bush

La Paz -

16° 17' S.

67° 58' W.

tree 10 m. tall, 15 cm. thick,  
sterile; leaves subglossy above,  
veins reddish below. (bark sample)  
sterile sprout 2 m. tall;  
leaves dull above, veins  
reddish.

27473

3

occasional in brush

5

74 *Cinchona calisaya*  
rare in brush

✓ (53)

all day

Sept. 17 - hills, 1 km. W. of  
Tajama, drainage of Rio Chulumani

↓

steep ~~rather~~ densely wooded  
slopes, not especially wet  
at this season

8

75 *Lophocampylus*  
common in cleared, brushy  
areas.

75

76 *Cinchona pubescens* var.  
common on steep slope

8

77 *Cinchona pubescens* var.  
common on steep slope

2

78 *Vaccinium*  
rare in thick woods

1

79 *Coccythium*  
rare in thick woodssmall tree 4 m. tall; flowers  
whitish.clump of sterile sprouts  
2 m. tall; leaves dull above.

16° 15' - 17° S

67° 37' - 74° W.

vine-like shrub,

tree 10 m. tall, 12 cm. thick,  
leaves dull above, veins  
slightly reddish; flowers  
fragrant, pale pink  
(bark sample)tree 8 m. tall, 9 cm. thick;  
leaves dull above, paler  
beneath; flowers fragrant,  
pale pink. (bark sample).  
vine-like shrub, tangled  
in undergrowth; corolla  
coral pink, mouth white,  
whole broadly ellipsoidal,  
waxy-fleshy.ascending 0.6 m. tall;  
fruit blue.

1947 Bolivia

28680 *Centropogon*  
rare along trail in woods

81 *Psychotria*  
rare in woods along trail

82 *Cinchona*  
common locally in woods  
on steep slopes

"quina amarilla"  
bark not harvested.

83 *Cinchona*

same

84 *Cinchona*  
in woods on steep slopes

85 *Palicourea*  
rare in woods

86 *Cinchona*  
common in woods

87 *Galium*  
common locally in woods  
on flat place.

88 *Cinchona pubescens* var.  
local on flat place

La Paz - Sur Yungas

arching weak shrub  
1.5 m. long; flowers brilliant  
orange, paler distally;  
column yellow, red at summit  
anthers purplish-gray.

slender erect shrub 2 m.  
tall; flowers whitish; fruit  
red when ripe.

tree 10 m. tall, 10 cm. thick;  
~~old~~ leaves glossy,  
red when old; flowers  
said to be whitish and  
to appear in December and  
January. (bark sample).  
same (bark sample)

sterile sapling 4 m. tall  
(possibly showing juvenile  
characters)

slender shrub 3 m. tall;  
thyrse green, fruit immature  
small tree 8 m. tall;  
leaves dull above, buds  
deep pink. (bark sample)  
vine-like; fruit fleshy  
red-orange.

Tree 8 m. tall; leaves sub-glossy  
above, veins ~~at~~ green, turning  
red in age. (bark sample).

1947 Bolivia

28689  
16*Cinchona pubescens* var.  
local on level place

Sept. 17 - Tajma, Sur Yungas

coffee and coca plantation.

90 *Erythroxylon* coca  
planted ~~in~~ in rows on  
~~some~~ narrow terraces on  
open slope10 91 *Cinchona calisaya*  
trees persisting at edge of  
coffee plantation on and  
at base of adobe wall⑤ Sept. 17 - road bet. Chulumani  
and Tajma

brushy roadcut

92 *Cinchona calisaya*  
steep brushy slope⑥ Sept. 17 - Chulumani, Sur Yungas  
weeds on bare ground in ~~exterior~~ orchard  
of experiment station93 *Drymaria*94 *Diastates*

La Paz - Sur Yungas 121

tree 7 m. tall, 15 cm. thick;  
flowers fragrant,  
pale pink (base sample)

1500 m. (e)

16° 18' S.

67° 32' W.

shrubs 0.5 m. tall;  
fruit immature.  
"coca" leaves chewed by  
Indians.tree 5 m. tall, gnarled  
and spreading, leaves  
glossy."quina calisaya"  
bark harvested extensively

1500 m. (e)

clump of sprouts 1.5 m.  
tall, sterile.

1500 m.

clumps, probably from seeds in manure.  
fls. lavender.

1967 La Paz

date

✓ (2) Sept. 27 - La Paz  
cultivated in garden (brought in by local person)

28695

*Cantua buxifolia*

"cantuta"

96

*Cantua buxifolia*

I

Sept. 29 - Altiplano south  
of La Paz, from El Alto to  
Ayacucho.

Entire altiplano is treeless,  
mostly intensive - cultivated  
or grazed, badly over grazed  
and eroded. ~~stop~~ much  
rolling land, occasional  
steeper ridges, the slopes  
very badly eroded, the  
steeper ones down to bed-rock.  
The gentler slopes are  
more intensively cultivated  
than the flat deposition  
areas below, probably because  
of ~~more~~ drainage vs. imperme-  
ability of soil below. No  
humus in evidence, much  
broken rock in soil.

La Paz

corolla with basal half  
of tube yellow, distal  
half and limb crimson.  
corolla with tube yellow  
more or less flushed with  
pink without, limb  
old-rose pink.

very thin close grass and  
#28702 covers ground, resists  
grazing to a certain extent.  
*Baccharis* and *Tetraglochin*  
are dominant on eroded  
slopes. *Tola* was formerly  
abundant on most of these  
areas, but now has  
been completely eliminated  
near La Paz by being  
harvested for fuel. An  
area at Collana still  
has *Lepidophyllum (tola)*  
as an almost pure stand,  
but relatively small  
plants (up to 0.4 m. on dry  
high ground, up to 1 m. on  
low sandy bottom-land),  
the larger ones having been  
harvested for fuel. *Tola* contains

1947 La Paz

with  
g. crests

23697

Sept 28 - Collano

*Papadaphnia**Lepidophylla* (Wedd.) Cabrera det. J. Cuatrecasas  
gently sloping alluvial  
soil, dominant and almost  
only species.

v (69) Sept. 28 Calamarca

bare rocky eroded slope

93 *Barnadesia* *Dasyphyllum* ferox (Wedd.) Cabrera  
rare det. J. Cuatrecasas

99

occasional

28700

*Baccharis incarum* Wedd. det. J.  
dominant plant1 01 *Senecio spinosus* DC. det. J. Cuatrecasas  
rare (one seen)3 02 *Junellia minima* (Meyen) Moldenke det. Moldenke  
very common, in places  
forming continuous ground cover.6 03 *Chersodoma iodopappa* (Sch. Bip.) Cabrera  
rare det. J. Cuatrecasas

04

occasional

branched shrub up to 0.7  
m. tall, aromatic, resinous;  
flowers yellow "tola" hawthorn  
and baled and sent to  
La Paz for fuel.

4200 m

much branched  
bush 1.5 m. tall, leaves  
mostly fallen; past  
flowering  
dwarf shrub, intricately  
branched, 0.4 m. tall;  
flowers yellow with  
purple-black markings  
on banner.

Cuatrecasas

dense dwarf shrub,  
resinous, flowers  
whitish.  
flowers deep purple-red  
with yellow anthers.forming dense gray  
mat; flowers white,  
tinged with pale lavender  
rounded densely branched  
bush.dried when collected. Said to  
be aromatic when fresh.

28705  
2

Tetraglochin

one of dominant plants  
over large areas of badly  
eroded land.

cultivated in plaza

06 Salix  
~~Stem~~

07 Salix  
1

much resin and is not  
eaten by anything but llamas.  
Their excrement, because of  
this resin, is a valuable fuel,  
and, when used as fertilizer,  
~~it~~ decomposes only very slowly.  
The plants are pulled up  
by the roots, baled, and  
shipped by rail to La Paz.

Several cacti including  
two of caespitose Opuntias  
and a red-flowered Echino-  
cactus with caespitose  
heads with very long  
dense slender spines are

dwarf shrubs 1-2 dm. tall.

shrubby tree, diffuse  
habit, 4 m. tall, with  
young fruit, leaves  
scarcely out. "sauce"  
same, & flowers, stigmas  
yellow-green; ♂ plants  
not seen. "sauce"

found on the rocky  
slopes. Pycnophylloides  
is locally common.

1947 La Paz Bolivia

✓ (70) Oct. 1 - La Paz

weeds in water between streets

28703 Senecio

3 09 Sisymbrium

1 10 Matricaria

Oct. 1 - La Paz - Guacqui by railroad.

The rainy season has started a month earlier than usual, and the grass tufts are already showing a slight touch of green.

The normal rainy season here is from about November to April. The rain supposedly comes from two sources -

Pacific winds which bring violent rains of short duration, and the Yungas (really trade) winds, which bring rains of longer duration but less violent (fide Posnanovsky).

During the dry season it is almost useless to try

La Paz

disk yellow.

flowers pale yellow

disk greenish yellow,

ray, white, scarcely developed  
plant aromatic.

to collect plants on the altiplano and near La Paz. Nothing is in condition. About March to May would be the logical time to collect here to get the most plants in condition.

1947 Bolivia

Sept. 23 - plant. collected  
aton shore of Lago de Titicaca  
by Guillermo Crespo & Raul Perez

A

B

Polyplepis

C

Baccharis

D

Baccharis

E

Cassia

F

Gnaphalium

G

Cassia

H

Baccharis

"mucina"

"guenina"

1947 Peru

Oct. 2 - Puno - Cuzco by rail  
 Around the lake at and  
 near Puno were many  
 gulls and some cormorants.  
 Great expanses of mud  
 flats have been exposed  
 by the lowering of the level  
 of the lake (7.3 m. since 1930  
 acc. ~~to the~~ <sup>to the</sup> ~~Cuzco~~, but  
 has risen 1.5 m. in last  
 2 years).

The valley above and  
 below Juliaca is quite  
 grassy. Stipa, etc.

Near Pucará the flat  
~~flat~~ valley floor is  
 of small hummocks of  
 white clay. There is a  
~~extensive~~ local pottery  
 industry here, producing  
 small figures, ash trays,  
 mugs, bowls, pitchers,  
 etc. of a rather unattractive  
 dark greenish brown glaze.

The upper valley of  
 Rio Pucará has broad  
 flat rich grasslands.  
 The grass is ~~more~~ abundant

Puno

and less overgrazed  
 here than anywhere I  
 have seen. Herds of  
 llamas, cattle & sheep  
 are abundant here.

It is said that during  
 the last few years when  
 the level of Lake Titicaca  
 has lowered, the ~~totora~~<sup>totora</sup>,  
 (Scirpus aff. lacustris) have  
 largely died off, and  
 that the "balsas" or boats  
 made of them have  
 largely disappeared.  
 The boats only last 2-3  
 years and must be replaced.  
 Now the Indians are learning  
 to use other boats and the  
 "balsas" may not come back,  
 even though the Scirpus is  
 reappearing with the  
 rise of the water.

1947 Peru

✓ (13) Oct. 2 Araranca, <sup>near head of</sup> Dis Purari  
Dept. Puno, Puno. Ayaviri

28711 ~~earth~~ Alchemilla  
2 earth bank of small stream  
in open puna grassland

✓ (12) Oct. 3 - Cuzco, ruins of  
Sachsahuanan  
brushy trail side  
12 Berberis  
occasional

✓ Oct. 3 Cuzco  
cultivated in patios

2 13

1 14 Lavatera

slopes below

✓ Oct. 4 - Machupicchu,  
canyon of Rio Urubamba  
steep slope, not dry but  
cleared and burned over, in  
some places brushy. 2040-2840 m.

5 15 Monnina  
rare

✓ 16 Dodonaea viscosa  
common locally

2 17 Liaburn  
rare in open places

Puno - Ayaviri  
Cuzco - Cuzco, Urubamba

14°30'S

70°55'W

4127 m. (m.)

prostrate, flowers  
greenish yellow.

13°31'S

71°59'W

Senecio is in much fuller  
bloom than 2 months ago, every-  
thing is much greener.

shrub 1 m. tall, intricately  
branched; flowers yellow

shrub 2.5 m. tall, flowers white.

shrub 3 m. tall; flowers  
rose-pink

2200 m.

shrub 1.5 m. tall, slender;  
flowers indigo-purple with  
greenish yellow keel.

2200 m.

slender small tree 4 m. tall

"

sprawling herb up to 1 m.  
long, lactiferous, flowers deep yellow.

- 23713 *Lantana*  
rare
- 2 19 *Senecio*  
rare
- 2 20 *Galium*  
occasional
- 3 21 *Phytolacca*  
rare
- 2 22 *Baccharis*  
rare
- 1 23 *Gnaphalium*  
not common
- 3 24 *Baccharis*  
not common
- 1 25 *Declieuxia*  
rare
- 1 26 *Begonia*  
rare
- 3 27  
common in rock crevices
- 5 28  
common in bush
- 4 29 *Verbena*  
common weed
- 4 30 *Solanum*  
occasional

- 2250 m. slender shrub 1 m. tall;  
flowers lavender-purple.
- 2400 m. herb 1 m. tall; flowers yellow.
- " vine-like; fruits  
orange, fleshy.
- " low, much branched herb;  
flowers white, touched with reddish.
- 2500 m. dwarf shrub, 3 dm. tall,  
branched at base.  
heads yellowish.
- 2700 m. sparsely branched shrub  
2 m. tall; flowers cream-white.
- " scape orange-bronze; flowers  
vermillion.
- 2750 m. fronds very young
- " shrub 2 m. tall; flowers  
bright purple.  
herb, branched at base,  
flowers violet.
- shrub 1 m. tall; flowers  
mauve

Peru 1947

✓ Oct. 4 Macchupicchu  
paths and terraces about ruins

24731

Fragaria

abundant on

3

32

Pityrogramma

common on cut earth banks

2

33

Heiracium

rock walls

4

34

Capsicum

cultivated on terrace of ruins

1

35

Galinsoga

weed on terraces of ruins

✓ Oct. 6 - Aguas Calientes, Prov. Cuzco  
near head of Rio Vilcanota

meadow filled with warm  
springs and streamlets flowing  
from them

14° 27' S

71° 5' W.

36

Hormidium

on bottom

in spring noticeably warmer

than body temp. but not uncomfortably  
warm, not sulphurous but with  
some iron

Cuzco - Urubamba  
Canchis

flowers white.

flowers yellow

herb 1.5 m. tall;  
flowers deep purple,  
fruit greenish-black,  
turning red when ripe.  
rays whitish, disk  
dull greenish yellow.

dull dark blue-green.

1947 Peru

Oct. 7 - Puno - Arequipa by rail. Valley of Rio de Crata is very flat, obviously recently drained lake-bed. Valley of Rio Cabanilla is pure puna, great expanse of "ichu" (*Stipa*) grazed but not much cultivated. Apparently burned over frequently. Mountains here are mostly not rugged. To Santa Lucia (4639 m.) the valley bottom is flat. After S. L. a steeper climb follows.

In the hills <sup>between</sup> ~~around~~ Lakes Cachipascana + Saracoche (+ - 4400 m.) "tola" scrub replaces the puna, locally, but much mixed with "ichu" some *Baccharis*. At <sup>Saracoche</sup> ~~Lagunillas~~ tola was seen baled for shipment. At <sup>Lagunillas</sup> ~~Paso Alto~~ a herd of llamas loaded with tola was seen. It is shipped to Arequipa + Puno for fuel.

Tetraglochin  
subdominant

Puno - Puno

above Lagunillas, around Paso alto. The grass changes. "Ichu" is <sup>largely</sup> replaced by a *Festuca* (?) also a bunch grass.

(Cañagua - cereal like *Quinnia*, smaller, plant very small 2-3 dm.) Puno.

Crucero Alto (14666 ft. acc. sign on station).

alkaline flats with turf + pools of water surrounded by low rounded hills.

Most abundant grass a very low turf sp.

Dry at this season.

Just beyond here are large herds of alpacas - smaller and more squat than llamas, shorter necks, thicker ~~hair~~ wool. Grazing in low wet meadows.

Also several small herds of vicuñas were seen not far from track, grazing in low wet meadows.

Beyond this an area of bare light soil with scarcely any vegetation - scattered bunches of grass and patches of *Pyrenophyllum*. Grass is dull, dark, <sup>Urtica</sup> <sup>purpurea</sup> <sup>purpurea</sup>. Pyren. golden yellow.

Copper like old lake bed. One part has a small lake still. Patches of Pyren. mostly eaten out in center, prob.

by alpacas.

This plain is the Pampa del Conchital.

In distance is magnificent snow-covered cone of Nudo de Ampato (6300 m.) Looks volcanic, as does N. de San Jeronimo, a little this side of it.

Alpacas said to need to eat close to soil to keep teeth from growing too long.

This pampa changes around Vincacayo (4377 m.) to snow into low sparse tola, widely spaced,

In hills about ~~Begant~~ <sup>Van</sup> Vincacayo is puna largely of *G. pungens*, lower down with some *G. ichu*. Of these the former is called ichu, the latter pajia.

Beyond Vincacayo tola is the dominant vegetation for a long distance, varied here and there by patches of puna or mixed.

Nearer Arequipa are several large bare volcanoes the principal ones being Chachani, a compound cluster of peaks,

Misti, a simple high cone, Pichupicchu, etc. Little snow on them now.

March and April said to be best months for plants here in high areas.

Tola <sup>largely</sup> replaced by puna as volcanoes are approached

1947 Peru

at Pampa de Amey, at west base of Volcan Chachani, baled tola seem to be a principal item of commerce.

From here on for a long distance is a waste-land of lava flows and ash beds with a true desert <sup>herb</sup> vegetation - small leaved intricately branched shrubs widely spaced. Cacti (Cereus) common. No trees. No livestock seen. Watercourses in deep gorges. A few flat places with water planted w alfalfa. Here ~~on~~ Salix & Eucalyptus and a few Schinus.

- (9) Oct. 7 - 5 km. s.w. Vincocaya, P. Lailloma  
Dept. Arequipa  
7737 *Stipa pungens*  
dominant on sandy flats

- Oct 7 - Pucacancha,  
Dept Arequipa  
38 *Lepidophyllum*  
dominant over large area

caespitose, prickly.

resinous aromatic  
shrub 0.5 m. tall; heads yellow  
"tola" used for fuel.

1947 Peru

Oct. 9 - Arequipa to Chala by road.

Leaving Arequipa the road climbs the rocky dry hills to the south of the valley. There are a great growth of at least 3 species of *Cereus*, one the massive erect columnar one seen further north, one a slender freely branching very spiny one, and one with a trunk and a dense irregular network of horizontal branches above. Sparse brush occurs here between the cañals. Nearer the coast the road descends and recrosses the valley below Arequipa. It is the usual green irrigated valley with dry bare walls.

North of here the hills and flat places are completely without vegetation except for a few irrigated valleys.

flowers in fruit in some of the cañals.

To Camana there is no strand veg. there is in flats behind beach.

Arequipa

until about 18-20 km. s.e. of Camana, the lomas had apparently been moistened by fog, and supported a thin but colorful growth of herbaceous plants. Most of these have thick roots or tubers. Their flowers in many cases are quite variable in color, i.e. *Nolana*, *Solanum*, *Piscia*, *Lotus* (?), etc. *Nolana* is dominant so that it actually gives a bluish color to the landscape. The soil is a fine, light colored silt.

The Camana valley is extensive, and has an important irrigation system.

North of here are a few patches of Lima vegetation, but poorly developed.

About 100 km. s. of Chala are rocky hills with the columnar *Cereus* and some other vegetation (seen at night only).

✓ (17)

Oct. 9 - 13 km. s.e. Camana

"lomas" or hills of fine light colored silty soil, with herbaceous vegetation only, dominated by Molana

28739

Phacelia

rare on small alluvial fan

6

40

Chenopodium

abundant locally on alluvial fan

41

Calandrinia (or similar)

common locally on alluvial fan

1

42

Chenopodium

rare on alluvial fan

1

43

Cryptantha

rare on alluvial fan

44

Verbena

rare on slopes and alluvial fan

1

45

Alstromeria

common on steep slopes

1

46

occasional on alluvial fan

1

47

common on ~~slopes~~ alluvial fan

3

48

Lotus

common on slopes and alluvial fan

3

49

Lotus

common on slopes (with # 48-49)

plant branched at base  
flowers deep purple.

annual (possibly young  
plant of # but probably not)  
very glaucous, fleshy,  
spike nodding, corolla  
deep crimson-magenta.  
probably young plant  
of #

flowers white

flowers white, but  
purplish tinged, strongly  
fragrant with honey-like odor.  
not in flower now

flowers bright rose.

flowers bright rose

flowers purple.

flowers white.

28750

- occasional on slopes
- 51 *Zygadenus*  
abundant locally on slopes
- 52 *Nolana*  
rare among plants of 2
- 53  
occasional at foot of slopes
- 54 *Solanum*  
abundant to common on slopes
- 55 *Solanum*  
rare, with # 28754
- 56 *Orymaria*  
common on slopes
- 57 *Chenopodium*  
occasional on slopes and roadside
- 58  
rare on slopes
- 59 *Nolana*  
dominant plant, abundant everywhere
- 60 *Oxalis*  
occasional on slopes,  
especially near rocks
- 61 *Cardamine* (?)  
local on steep slopes, especially  
near rocks

flowers white, purplish  
outside, especially on midribs  
of segments.

white flowered extreme  
of # 28759

rays deep yellow,  
inner bracts reddish,  
base of outer bracts reddish  
flowers varying from  
white to deep purple, <sup>deeper</sup> at center,  
anthers yellow.

entire leaved extreme of  
# 28754.

flowers white, petals  
entire.

perennial, plant  
depressed.

prostrate flowers  
violet, varying to  
deep purple and to white.  
tuber orange within;  
flowers bright yellow,  
flushed with vermillion outside.  
erect; flowers white.

- 24762 *Cryptantha*  
steep slopes near rocks, very local
- 3 63 *Tetragonia*  
common on steep slopes
- 2 64 *Plantago*  
common on slopes
- 3 65  
common on steep slopes
- 1 66  
occasional on slopes and ravine side.
- 5 67 *Nicotiana*  
common along roadside  
and banks of ravine
- 1 68 *Hypericum*  
rare on banks of ravine
- 6 69  
common on banks of ravine
- 1 70 *Erodium*  
rare on banks of ravine

flowers white.

leaves fleshy, covered  
with crystal-like glistening  
distended cells; flowers  
yellow.

flowers bright rose.

erect herb 1-1.5 m. tall;  
flowers yellow

flowers orange-yellow.

flowers bright rose

flowers rose.

1947 Peru

✓ (83) Oct. 10 - First headland  
north of Chala, km. 440

rocky slope, dominated  
by dwarf shrubby *Heliotropium*  
and *Sphaeralcea nolana*

277 71 *Argemone mexicana*  
common along roadside

5 72 *Heliotropium*  
dominant on rocky slope

3 73 *Heliotropium*  
same

4 74 *Heliotropium*  
same

6 75 *Sphaeralcea nolana*  
dominant, in places  
coloring slopes purple.

5 76 *Croton*  
occasional

✓ (15) Oct. 10 Los Arenales, km. 600  
40 km. n.w. of Chala

bare sand flats and small  
dunes just back of beach

6 77 *Lesqueria*  
large masses holding  
small hummock-like sand dunes

3 78 *Macrocystis*  
thrown up on beach in large quantities

to 0.8 m.  
yellow.  
of shrub,  
with  
do,  
in center.  
it with

te,  
several  
we

h.

flat  
dune

of sand

stems 1 cm. thick; leaves  
very fleshy but compressed,  
gray; flowers pink.  
(much larger in every way than S. prot.)  
long, ~~several~~ m., vine-like.

28702 - 10  
28711 - 96

where located  
where models

please see whether

28702 - 10 (find in)

and 28711 - 96 (find in)

on ~~off~~

still missing

Also see if 28000 - 165

and 28250 - 70 are

missing too yes

1947 Peru

✓ (85) Oct. 10 - First headland  
north of Chala, km. 640

rocky slope, dominated  
by dwarf - shrubby *Heliotropium*  
and *Sphaeralcea nolana*

277 71 *Argemone mexicana*  
common along roadside

5 72 *Heliotropium*  
dominant on rocky slope

3 73 *Heliotropium*  
same

4 74 *Heliotropium*  
same

6 75 *Sphaeralcea nolana*  
dominant, in places  
coloring slopes purple.

5 76 *Croton*  
occasional Taraca.

✓ (86) Oct. 12 Los Arenales, km. 600  
40 km. n.w. of Chala

bare sand flats and small  
dunes just back of beach

6 77 *Sesuvium*  
large masses holding  
small hummock-like sand-dunes

3 78 *Macrocystis*  
thrown up on beach in large quantities

glaucous herb up to 0.8 m.  
tall; flowers pale yellow.  
low, branched dwarf shrub,  
flowers fragrant with  
strong honey-like odor,  
white with yellow center.  
same, flowers tinged with  
purplish.

same, flowers white,  
center slightly greenish.  
spreading; flowers  
rose-purple.

low much branched bush.

back of this, across a flat  
is an actual mountain  
of sand

stems 1 cm. thick; leaves  
very fleshy but compressed,  
gray; flowers pink.  
(much larger in every way than S. port.)  
long, ~~many~~ <sup>several</sup> m., vine-like.

1947 Peru

✓ (10) Oct. 10 - 4 km. s.e. of Valle  
de Vaca, 2.0. of Nasca  
desert with no vegetation  
but lichens, except along  
road sides where a  
number of plants are common.

78779 *Chenopodium*  
common along roadside

30 *Suaeda*  
rare along roadside

4 81 *Amaranthus*  
abundant along roadside

✓ Oct. 10 - Nasca

irrigated valley,  
roadsides and stony wash

5 82 *Bulnesia retama* (Gill.) Griseb.  
common on stony ground  
in washer and alluvial  
fans (for many miles  
on alluvial fans practically  
the only plant)

5 83 *Buddleia*  
common along fence-row

5 84 *Pluchea*  
common along fence-row

5 85 *Trixis*  
common along fence-row  
and on rocky ground

reddish - glaucous,  
densely branched.  
glaucous, fleshy,  
densely branched, erect.  
reddish, bushy, erect.

dull green erect  
shrub 1.5 m. tall,  
~~the~~ almost leafless,  
flowers yellow. "calato"

shrub 3 m. tall; flowers  
lemon yellow.

shrub 2.5 m. tall,  
heads purplish.

shrub 1 m. tall;  
flowers yellow.

1947 Peru

Oct. 10 - Chala to Ica by road.

Just north of Chala, across the bay, there is a headland of rocky hills that are green. High up, are patches of what are probably *Lichinus rostratus*. It also runs down certain ravines. A *Nolana* with purple magenta flowers, *Fraxinella* like, mallow color, many of the hills purple. Locally there is something that looks a bit like *Echscholtzia*, but I did not get a close look at it.

at Tanaia  
About 40 km. n.w. of Chala there are small dunes covered and held by a gigantic *Lesquerium*. Behind this, some way in from the coast, is a mountain of sand. Several more like this seen further north, but further in from coast.

about 50 km. s. of Valle de Vaca, (70 km s.s. of Nasca) is an area with a very noticeable perennial vegetation of a prostrate *Peliotrochium*, an erect *Nolana* (?) and quite a number of other things. Did not stop. This extends much further north right along the road but not naturally. I don't know why. There is vegetation along roadsides and not away from them.

The Valle de Vaca region, outlier of Nasca valley, is interesting in that it is the southern limit of a number of plants, at least as far as the road is concerned - such as *Prosopis*, *Vallesia*, *Parkinsonia aculeata*, *Tricus*, *Pluchea*, <sup>Bulnesia</sup> 23782 etc. The latter is practically the only shrub or plant on tremendous areas of alluvial fan, such as Pampa de Cinco Cruces, n. of Nasca. Present more or less

1947 Peru

intermittently as far as  
Ica Valley.

Incised occasional  
in some of valley, between  
Nasca & Ica, with  
*Jarvisonia aculeata*.

*Prosopis* very common here.

Cotton is raised as  
far south as Nasca,  
some sporadic unsuccessful  
attempts further south.  
A curious shrubby  
perennial species is  
raised, which blooms  
and produces cotton at  
same time.

In valley between Nasca  
and Ica Oranges are  
principal tree crop, as well  
as cotton. In Ica Valley  
cotton and grapes are  
most abundant. At  
this season the grapes  
seem to have just  
leaved out. Many are  
the latest very somewhat.

*Salix* here mostly  
diffuse and weeping  
types, as now in full flower.

The squares in Ica  
are dominated by huge  
*Ficus nitida* (?) trees.

In all these valleys, from  
Camana to Ica, *Ficus*  
*carica*, here called *higo*,  
is very common.

In the ~~next~~ valley de Yauca  
south of Valle de Ica  
is a tremendous grove  
of olives. It fills the whole  
irrigated part of the valley.

Back of Ica the ravine  
on the steep slopes are conspic-  
uously filled with sand.

In Ica are occasional  
*Eucalyptus*, *Phoenix*,  
and *Washingtonia*, *Previllea*,  
*Cedrela*, *Delonix*.

Oct. 11 - Ica - Lima by road.  
 From Ica west as vast  
 sand plains and sand hills.  
 about 30 km. w. is a large  
 area where *Phoenix dactylifera*  
 is abundant. Again, about  
 30-50 km. further is another  
 such area, quite extensive.  
 Here *Ficus carica* is also  
 common. Both appear wild.  
 These areas are quite saline.  
*Distichlis* and another grass,  
 a slender reed, are dominant.  
 In the second area, at about  
 km. 271, salt water appar-  
 ently comes to the surface  
 by capillarity, evaporates,  
 leaving an extensive deposit  
 of salt in the surface  
 layers of the sand, in  
 some places being almost  
 pure, in others much mixed  
 with soil. This should be  
 analyzed for potassium. If  
 by chance there is any K. it  
 would be exploitable.

Back of Pisco are salt  
 marshes and standing salt  
 water. *Distichlis* is principal

inland  
 from Pisco

vegetation, but *Salicornia*  
 is common.

*Phoenix dactylifera*  
 is occasional throughout  
 this salty area. The  
 fruits are said to be  
 not very good.

Oct. 11 - Km. 190

n. w. of

Chincha

desiccated roadside  
depression with <sup>very</sup> patch of  
vegetation in otherwise  
absolutely bare ground,  
with *Chenopodium murale*,  
*Trifolium* sp. (sterile),  
*Sesuvium portulacastrum*  
and *Heliotropium curassavicum*.  
*Heliotropium curassavicum*

28786

2

87

*Sesuvium portulacastrum*

✓

Oct. 11 - Asia,

dry, <sup>brushy</sup> roadside

2

88

*Solanum*

5

89

*Verbesina*

occasional in bush

3

90

*Lippia*

common along roadside

9

91

occasional in bush

prostrate, glaucous;  
leaves fleshy; flowers  
white with greenish  
anthers.

prostrate, stems  
reddish; leaves flat,  
fleshy; flowers pink.

semi-prostrate; flowers yellow.  
shrub, m. tall; rays  
yellow, disk greenish-brown.  
prostrate; flowers pink.

shrub 1.5 m. tall  
much branched, mostly  
base of leaves.

✓

Oct. 12 - Lima

botanical garden

74792

*Cardamine bonariensis*  
in muddy ditch

4

93

*Lambus*  
planted

2

94

*Viburnum*  
planted

2

95

*Helioscarpus*  
planted

3

96

*Cantua pyrifolia*  
plantedflowers white, valves  
of pods elastically coiling  
on dehiscence.~~tree~~ bushy tree 5 m. tall.  
flowers white, fruit black.  
tree 5 m. tall; flowers  
white.tree 8 m. tall  
shrub 2 m. tall; flowers  
whitish.

1947 Peru

Oct. 20 - Tingo Maria,  
Rio Huallaga

Flat valley floor with tall forest, now largely cleared, but evidently formerly with a canopy 30-40m from ground. Now largely open, even where remain patches of forest, so there is a dense undergrowth of *Heliconia*, *Acanthaceae*, etc.

The sides of the valley are bluffs and lower of limestone, magnificently wooded. However, even with all this limestone the soils are said to be acid.

1947 Peru

Oct. VI

Going from Tingo Maria to Cordillera Azul as soon as the road begins to rise over low foothills along sides of valley, *Ladenbergia magnifolia* and *Cinchona micrantha* begin to appear, but only as seedlings and sprouts, as the parts near the road have been cleared.

At km. 140 there are quebrada walls with second growth woods with *Ladenbergia magnifolia* and another *Ladenbergia* with brown hair. All trees seen were young and sterile.

The road gradually climbs and the *Ladenbergia magnifolia* persists, but *C. micrantha* drops out. A *C. pubescens* var. similar to the *q. amaillo* of Tabacomas appears rarely, seedlings only. *Comibaco* also. No large trees seen.

Tea plantations frequent here. Very wet. The woods, where remaining are thick.

At Divisoria, the gap in the mountain is a belt of *Cinchona* - *C. pubescens* (ovata) and *C. ?* (like *lucumacolia*)

1947 Peru

✓ ⑤

Oct. 21 - Km. 160, road from  
Tingo Maria to Pucallpa,  
drainage of Rio Huallaga

second growth forest on steep  
side of ravine.

28797 *Cinchona* (Ladenbergia)  
common locally

✓ ⑦

Oct. 21 Km. 189, road from Tingo  
Maria to Pucallpa, just  
w. of La Divisoria, Cordillera  
Azul

weedy roadside thickets

5 98 *Acalypha*  
common

4 99 *Amaranthus spinosus* L.  
common weed

28800 *Deeringia*  
common

4 01 *Physalis peruviana*  
occasional

950 m. (E)

9° 4' S  
75° 53' W

slender sapling 2 m.  
tall sterile.

1500 m. (E)

shrub 2 m. tall

herbs up to 1 m. tall  
spines very poorly developed.  
spawling vine-like  
herb, to several m. long,  
buds green, fruiting  
panicles red, seed embedded  
in white pulp.

branched herb, up to 1 m.  
tall flowers pale dull  
yellow with 5 purple-black  
spots in center. fruit edible  
but scarcely ~~edible~~ maturing  
here. "capuli"

1947 Peru

23902

Phenax

12. 03  
04

occasional

4 05

Liabum

common

2 06

Erigeron canadensis  
common✓ Oct. 21 - La Divisoria,  
Cordillera Azulsecond growth woods,  
quite wet.

2 07

Vaccinium

occasional on ~~low~~ wet banks

3 08

Cinchona

common

5 09

Cinchona

common

10. Sabicea

occasional

1 10a

Cinchona pubescens

occasional

subshrub

herb 1-1.5 m tall, arching,  
lactiferous; flowers  
pale yellow.herb 1 m. tall; heads  
white. "huamanta"  
said to be  
boiled and used for  
diarrhoea.

(600 m. (2))

sprawling shrub,  
flowers coral red, pale  
distally.sprouts 2 m. tall,  
sterile, leaves green.  
tree 5 m. tall, several  
trunks 8 cm. thick;  
leaves green, subglossy,  
petiole & midrib only  
slightly red. (bark  
sample).twining vine; flowers  
white.seedling 1 m. tall, sterile,  
leaves dull above, red-purple beneath

JP 1947 Peru

V 20

Oct. 21 - Fundo Linchons,  
Cordillera Azul, Rio  
Chino, drainage of Rio  
Ucayali

wet forest, largely  
cleared.

28811  
17

*Cinchona* (Badenbergia) *magnifolia*  
~~occasional~~ occasional on  
steep wall of river gorge

12

occasional, roadside thicket

2 13

*Cinchona*

~~occasional~~ planted in plantation

14

weed in small ravine  
in plantation

4 15

*Polymnia*

weed in roadside thicket

2 16

*Drymaria cordata*  
roadside weed

3 17

*Centropogon*

common in roadside thickets

1500 m (c)

tree 25 m. tall, 4 dm.  
thick; fruit immature

shrub 2 m. tall

young sterile plant

1.5 m. tall (note new leaves)

shrub 2 m. tall

flowers white

spreading herb,  
heads of orange-yellow,  
achenes large, green.  
ascending, diffuse

elongate sprawling shrub,  
leaves diminishing  
distally, terminal part  
of branch bearing raceme  
variously bare or leafy,  
flowers scarlet, orange  
distally, column pale yellow,  
anthers light gray.

1947 Peru

- 28817 *Lycopodium*  
 2 cut bank above road  
 19 *Cinchona glandulifera*  
 20 in seed beds in full  
 21 sun  
 28

✓ 21 Oct. 22 Divisoria, Cordillera  
 Azul

main divide of Cordillera,  
 wet forest, mostly cleared.

- ✓ 23 *Cinchona pubescens* Vahl  
 in clearing

- ~~24~~  
 24 *Cinchona pubescens*  
 in bushy cleared  
 land, very common

- 7 25 *Cinchona pubescens*  
 in thick tangled very  
 wet woods, beside  
 standing water

erect

stipules deeply cuneate  
 sterile seedlings 0.7 m.  
 Tall, erect, seeds brought  
 by H. Augusto from upper  
 Rio Monzon.

(600 m. a)

old half dead stub  
 with a few living  
 branches <sup>fruit</sup>; leaves purple  
 beneath; flowers (out of  
 season) very fragrant,  
 deep pink without,  
 pale pinkish within.  
 mass. coll. of an upper  
 side - branch tips each  
 from various plants,  
 to show variation, possibly  
 due to hybridization  
 with #28309.

tree 8 m. tall, 20 cm.  
 thick; leaves green  
 beneath, fruit abundant  
 (bark sample)

1947 Peru

28826 *Cinchona pubescens*  
in clearing

3 27 *Palicourea*  
in undergrowth in <sup>thin</sup> woods

3 28 *Solanum*  
in undergrowth in thin woods

7 29 *Cinchona pubescens*  
in plantation clearing,  
left from forest.

2 30 *Cinchona pubescens*  
wild plant planted in  
plantation

6 31 *Cinchona calisaya*  
planted in plantation

5 32 *Cinchona pubescens*  
planted in plantation from  
wild

33 ~~B~~

1 33 *Cinchona*  
wild plant persisting in  
plantation

small tree, 4 m. tall;  
leaves green beneath;  
heavily fruiting;  
apparently infected  
with *Elaeis cinchonae*.

slender shrub 2 m. tall; thyrse green;  
flowers white.

weak shrub, ~~2 m.~~ 1 m. tall,  
somewhat sprawling;  
flowers white

tree 5 m. tall; leaves  
purplish beneath,  
especially on veins,  
not fruiting abundantly.

sapling 3 m. tall,  
leaves purplish beneath,  
especially on veins.

small tree, 2.5 m. tall,  
flowers pink, fragrant;  
seedling from ex-japanese  
planting at Puniza (edge).

sapling 3 m. tall;  
leaves somewhat purplish  
beneath, red veins.

(showing some suggestion  
of hybridization with  
#28809 - thick small leaves).

leaves glossy above,  
green beneath, only oldest  
leaves with red ~~veins~~ midrib + petiole

1947 Peru

don't

✓ (13)

Oct. 22 - Purnahuarasi  
 Rio Tulumayo, affluent  
 of Rio Huancayo

steep rocky cut near river

28834

*Cosmibuena*

3

occasional, but only  
 young plants seen  
 (true both here and at  
 Divisoria)

✓

Oct. 22 same, further  
 down

flat valley bottom

5

35

*Hamelia patens*

common along roadside  
 ditches

3

36

*Erythroxylon coca*

cultivated on valley floor  
 (also on slopes)

plants planted in  
 holes about 2-3 dm.  
 square and deep, then  
 gradually transformed  
 by cultivation into  
 ditches as the holes are  
 brought connected.

shrub 1 m. tall, leaves  
 green, very thick.

shrub 1 m. tall;  
 flowers deep orange-red.

slender shrubs ~~1-1.5 m.~~  
 1-1.5 m. tall, ~~fls~~ leaves  
 pale green; flowers  
 white; fruits red  
 when ripe. Leaves  
 have been stripped  
 frequently.  
 Her

1947 Peru

Oct. 23 - same Km. 164

steep wooded slope

23837

*Cinchona (Ladenbergia)*

24

occasional

~~tree~~ in hollows, inhabited by ants.

8

38 *Viernia*

common

Oct. 23 Hacienda La Vega,  
drainage of Rio Tulumayo,moist forest, partly  
cleared, clearings planted  
to tea and pineapples, but  
badly overgrown with  
*Pteridium aquilinum*39 *Cinchona micrantha*small tree left in  
clearing40 *Pteridium aquilinum* (L.) Kuhnextremely abundant,  
dominant weed over  
tops and sides of cleared  
hills, often burned.41 *Psychotria capitata* K. & S. det. Kirkbride

left in clearing.

950 m. (e) tree 10 m. tall, 12 cm. thick,  
leaves dull, not turning  
red. (bark sample)shrub 2 m. tall (others  
seen 5 m.); calyx brown,  
corolla pale green.

1000 m. (e)

small tree, 4 m. tall,  
leaves dull above, veins  
turning red; flowers  
white, fragrant.rhizomes prostrate,  
subterranean, prostrate  
1-2 m. tall, densely  
tangled.small tree 6 m. tall,  
10 cm. thick; leaves dull,  
green beneath, turning red  
when old; flowers <sup>fragrant</sup> white, <sup>without below,</sup>

(bark sample)

1997 Peru

42

*Cleagia*

commonest tree in forest

43

common in forest

44

*Psychotria macrophylla* R. & P. det. Kirkbride, 1977

common in forest

45

*Cinchona* (*Ladenbergia*)

common in forest

46

*Aphelandra* det. D. Wasshausen

rare in underbrush at edge of forest

47

rare, climbing in trees in forest

This region, an old flood plain in the valleys of Rio Tulumayo and Rio Azul, stretching between the two, is dissected toward the two rivers by series of quebradas. It is said to be, and apparently is, much drier than either the valley of the Huallaga or the Cordillera Azul.

slender tree 7 m. tall, others many times as large. small clumps.

sterile sprouts  $\frac{2}{3}$  m. tall.

tree 15 m. tall, 18 cm thick; leaves dull to sub-glossy. (bark sample)

shrub 1.5 m. tall, corolla curved, yellow.

vine, twining; flowers whitish; fruit green.

the forests on the quebrada slopes are largely *Cleagia* and *Ladenbergia*. but have a liberal sprinkling of *Hevea* (with yellow latex) and some other trees, including a small palm. the flat is cleared. *Cinchona micrantha* is found on the flat and down over its edges in the heads of the quebradas, but not much further down.

1947 Peru

d. 5

✓ (50)

Oct. 24 - Carpiash Pass, ~~the~~ just  
w. of gap.Low mossy cloud forest  
~~and~~ with brush on ridges.

28848

Centropogon

5

occasional in brush

✓

49 Nertera tetrasperma HBK.

abundant locally

2

50 Thuidium

abundant

4

51 Chusquea

common

5

52 Gaultheria

occasional in brush

7

53 Symbolanthus

occasional in brush

2

54 Macrocarpaea

occasional in brush

Huancayo

sparsely branched  
shrub, 1 m. tall; flowers  
red with yellow lobes  
and column, blackish  
anthers.prostrate, forming mat;  
~~flower~~ fruit dark red,  
4 seeds.tangled climbing canes,  
inflorescences dark red-  
purple. communally  
flowering over a small area.

shrub 1 m. tall;

flowers coral pink.

shrub 2 m. tall; flowers

somewhat flattened

laterally, rose-crimson

with white and purple

lines in throat, tube

vermillion without.

erect shrub 2.5 m. tall.

1947 Peru

- 28855 *Salicourea*  
rare in brush
- 56 *Myrsine*  
common in brush
- 57 *Nertera granadensis*  
rare on ground in forest
- 58 *Cinchona (obovata?)*  
common in brush and woods.
- 59 *Cinchona*  
same
- 60 *Cinchona*  
same
- 61 *Cinchona*  
same
- 62 *Cinchona*  
same

I

Huancayo

- stiffest shrub 1 m. tall;  
inflorescence green; fruit  
immature.
- slender, sparsely branched shrub  
2 m. tall; fruit immature.  
prostrate, sterile.
- shrub 3 m. tall; fruit  
deep red, ribbed when fresh.
- shrub 2.5 m. tall; fruit  
deep red, ribbed when fresh.
- slender tree 5 m. tall,  
buds rose-vermillion,  
fruits deep red, ribbed  
when fresh. (bark sample)
- shrub 1 m. tall; fruits  
leaves purplish beneath;  
fruits deep red, ribbed  
when fresh.
- tree 8 m. tall, flowers (one  
old one only seen) rose vermillion  
without, lobes pink within,  
apparently odorless; fruits  
deep red, ribbed when  
fresh. (bark sample)

1947 Peru

J  
v (22)

Oct. 24 Upper Rio Chinchao  
above Hacienda Pati, below  
Carpish Pass

steep canyon wall with  
dense wet forest.

18863  
29

*Cinchona (nitida?)*  
common locally

64 *Drymaria*

common locally along road

65 *Centropogon*

common locally

I

v (23)

Oct. 24 Side of valley of  
Rio Chinchao, above  
Chinchao

thick second growth woods  
on ~~steep~~ precipitous slope

7

66 *Cinchona (purpurea?)*

common (with #18867)

Peru

9°40'S

76°5'W

tree 10 m. tall, 10 cm. thick,  
leaves glossy, bright  
rather light green, turning  
scarlet when old.

(bark sample)

prostrate to ascending,  
flowers white.

spreading, vine-like  
shrub, inflorescence  
pendent, flowers yellow,  
with yellow column, straw  
colored anthers, bronze  
green hypanthium & calyx.

Coordinates?

tree 6 m. tall, 10 cm. thick,  
leaves dull above, purple  
beneath.

(bark sample)

1947 Peru

28867 Cinchona (wata?)  
 common (with #28864)

✓ (11) Oct. 24 Divisoria, Cordillera  
 azul

68

in woods

I (brought in by Rivers)

Huancayo

tree 8 m. tall, 10 cm. thick,  
 leaves dull green above  
 and below,  
 turning red in age.  
 (bark sample)

stump, sprouts (tree  
 reaching great size);  
 flowers yellowish white;  
 fruit discoid, red when  
 ripe, with powerful  
 turpentine odor when broken.





al  
me  
e  
in  
my  
line

1

Rafael Peña

lawyer of Santa Cruz, Bolivia who published *Flora Cruceña* (1901 fasc.) and poss. an earlier edition. Locally said to have based it on an early ms. left by a Frenchman who died here. Supported by a curious fact that Peña was addicted to the use of a drink consisting of alcohol in which had ~~been~~ soaked a plant ~~hierba~~ de cerea(?) which does not appear in the book.

---

Borela - botanical student of Santa Cruz who apparently never wrote anything but who studied the flora zone and one of whose sons now teaches botany at S.C.

1 Peña R. (apael)

## Flora Cruceña

1-287, Sucre, Bolivia 1901

an extremely badly prepared flora  
of the Santa Cruz area, Bolivia. It is  
reported to have been a ms. left by  
a Frenchman who died here long  
ago. Apparently a shorter edition  
was published previously, and  
recently a new, much worse one has  
been issued. (over)

The plants are arranged  
alphabetically either by local  
or supposedly botanical names.  
There is scarcely a name more  
recent than the time of Linnaeus.  
Principal value is local names  
and uses.

Of Cascarilla, said to be, in Santa Cruz  
"diversas especies, como quina lanuifolia  
quina Hexandra."

"Iboti" said to be Guarani name.

João R. Costa

## ALICE IN BLUNDERLAND

Alice in Wonderland never saw anything more fantastic and grotesque, yet legal, than the action of the city-county liquor commission last week.

The liquor commission suspended the license of a local retailer for four violations of selling liquor below the "locally prevailing retail price."

The fantastic and grotesque aspect of this is not only in the penalizing of a man for selling at low prices. It is that the penalizing is according to law—in fact the city-county license commissioners had no alternative if they followed strictly the provisions of the law.

For this ridiculous situation we have to thank the action of a past legislature which wrote into the Revised Laws of Hawaii this section:

"It shall be unlawful for any person holding a retail dealer's license to sell any liquor under such license at any price less than the locally prevailing price."

And the law so stands today though an abortive effort was made to amend it at the 1947 session of the legislature.


And so a dealer who was endeavoring to pass along to his customers savings which he was able to make in liquor on hand, has been penalized by the suspension of his license for one week.

Alice in Blunderland is right!

\* \* \*

Why didn't the 1947 legislature go through with the amendment which would have eliminated this ridiculous stipulation?

Who put on the pressure or threw the sand in the machinery of legislation?



ouse

nkets

Blanket for truly luxurious  
and while one lightweight  
virgin wool;

**41<sup>75</sup>**

72" x90", ....

onth

nt

Blankets

50% wool blankets cover  
ness. Secret of its warmth

# **Insect Problem Studied Here by Entomologists**

Insect pests of the western Pacific face a bleak future with some of the leading entomologists of the nation now in Honolulu to conduct a historic meeting to evolve methods of combatting the tiny visitors.

The three day conference, first of its kind ever held, begins Tuesday and has been arranged by the Pacific science board of the national research council in conjunction with the navy department, Hawaiian Sugar Planters association and other scientific groups.

# # #

Arriving from the mainland this morning were Harold J. Coolidge, executive secretary of the science board; Dr. C. P. Causen, principal entomologist of the U. S. bureau of entomology and plant quarantine in Washington; D. C. and Theodore R. Gardner of the nation entomology bureau.

# # #

Edward H. Bryan Jr. is the Honolulu representative of the science board who will participate as well as representatives from HSPA.

From the meeting a detailed set of quarantine regulations covering insect pests of Micronesia is expected to evolve.

## High Tides Force Closing of Moana Hotel Dining Room

Because of the damaging effect of recent high tides and waves the dining room of the Moana hotel will be closed Wednesday, October 1,

---

## MIGHTY MITE

PALO ALTO, Calif., Sept. 29 (U.P.) —A bazooka-sized atom-smasher that will generate the first artificial cosmic rays and the highest charge of electricity ever produced by man has been revealed here.

The three foot long electron linear accelerator, a tiny cousin to the cyclotron, already has produced energies of more than 1,500,000 electron volts.

---



Mississ  
73753

still  
missing

?

to 796 ~~247~~

~~247~~

~~247~~



km. 600

Los Arenalles

40 km. n. of

Chala

Headland <sup>6.40</sup> km.

Across bay

from Chala

km. 535

40 km. s. e.

Valle de Vaca

s. e. Nasca

Nasca.

Vallena not

seen s. of

Valle de Vaca

Parthenon ac.

also.

Colégio Maria Auxiliadora

Playa Bolognosa

Padre Lombroso

Padre Inerata

avena machacada Kls  
cuchetas ✓

TOTALES

SALDOS ANTERIORES

RECIBO DE ALMACEN

T O T A L

ENTREGAS EN EL DIA

SALDOS

ENCARGA

Monte pascu

Huairamayo

Lihunsa

Chacatarume

x Anchus quebrada

# OCTUBRE

31 días

MIERCOLES

1847

OCTUBRE							1	NOVIEMBRE						
D	L	M	M	J	V	S		D	L	M	M	J	V	S
—	—	—	—	—	—	—		—	—	—	—	—	—	—
—	—	—	—	1	2	3 4		30	—	—	—	—	—	1
5	6	7	8	9	10	11		2	3	4	5	6	7	8
12	13	14	15	16	17	18		9	10	11	12	13	14	15
19	20	21	22	23	24	25		16	17	18	19	20	21	22
26	27	28	29	30	31	—		23	24	25	26	27	28	29
—	—	—	—	—	—	—		—	—	—	—	—	—	—

10o. mes — S. Remigio — 274—91

Elip V. Miller

The Middle Huallaga  
River

1-66 (typewritten,  
in OFAR files)

Jan. 1947

Excellent geographic  
study,  
emphasis on soils.

MacCurdy, E. (ed.)

The Notebooks of  
Leonardo da Vinci

1-1247. Garden City, N.Y.

1941-42

da Vinci, Leonardo

The Notebooks of  
Leonardo da Vinci

edited by Edward MacCurdy

1-1247 Garden City, N.Y.

1941-42

Translated into  
English and arranged  
by subject.

# GRAN HOTEL "COCHABAMBA"

COCHABAMBA-BOLIVIA

DIRECCION TELEGRAFICA "GRANHOTEL"

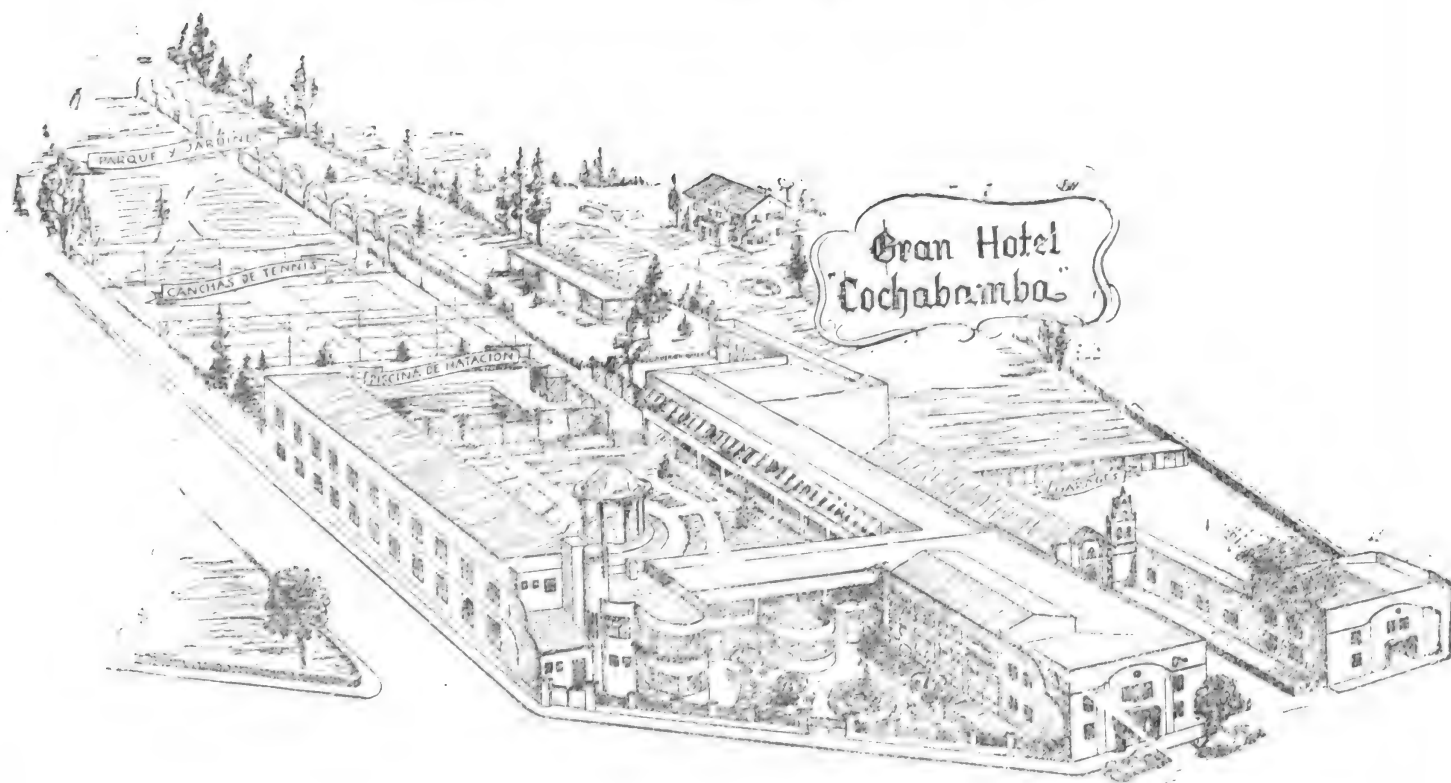
CASILLA DE CORREO No. 500

TELEFONO 1224-1225

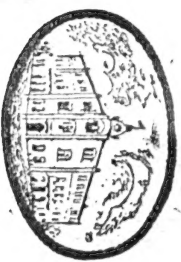
---

ARAUCO PRADO Y Co.

COCHABAMBA-BOLIVIA



Seeds



# “ROYAL” HOTEL

CASILLA N° 16

CHICLAYO - PERU

TELEFONO N° 181

PARQUE PRINCIPAL

DIRECCION TELEGRAFICA “ROYAL”

80 HABITACIONES CON TODO CONFORT Y 40 DEPARTAMENTOS CON BAÑO PROPIO  
PROPIETARIOS:

SILVA HERMANOS. S. A.

*Cinchona delessertiana?*

*from Tabaconas,  
Dept. Cajamarca, Peru*

*Part for Exp. Sta.*

*Part for Naranjo.*

*F.P. Fosberg #27800*

